

TECHNOLOGY DEPT. The Refrigeration Service Engineer

VOL. 11 NO. 5

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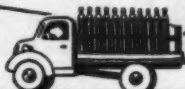
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WHATEVER YOUR NEEDS, LET THE FRIENDLY ANSUL JOBBER NEAR YOU SERVE

It's Time to Tell About Refrigeration's "Hidden Services"



May, 1943

2

THE REFRIGERATION

take BUTTER for instance...

When Mrs. America tears eight precious Ration points out of her Ration Book for a pound of butter, she little realizes that only because of Refrigeration is that butter made available.

Mechanical Refrigeration started working a week or even a month before, to successfully carry that butter safely to market, and to the dinner table. Refrigeration cooled the milk at the farm, kept it at safe low temperatures in great trucks moving across the highways to creameries and dairies, protected it through dairying processing, churning, packing, until the butter in final form was delivered to storage. There, under carefully controlled refrigeration again, the butter awaited distribution to Dealers' display cases and finally to the home refrigerator.

Most rationed foods are perishable, require accurately controlled DEPENDABLE Refrigeration to prevent spoilage and waste. A-P DEPENDABLE REFRIGERANT CONTROL VALVES are helping Mechanical Refrigeration perform this great task of food protection so vital to war today... Offering DEPENDABLE, super-sensitive Refrigerant Control that keeps Refrigeration units operating efficiently with a minimum of service attention.



A-P Model 204 - Used on Freezers, Cold Storage, and Home Refrigerators.



A-P Model 205 - Popular on Retailers' Display Cases, Truck Units.



A-P Model 215 - Found on Larger Commercial Cold Storage Refrigeration Units.

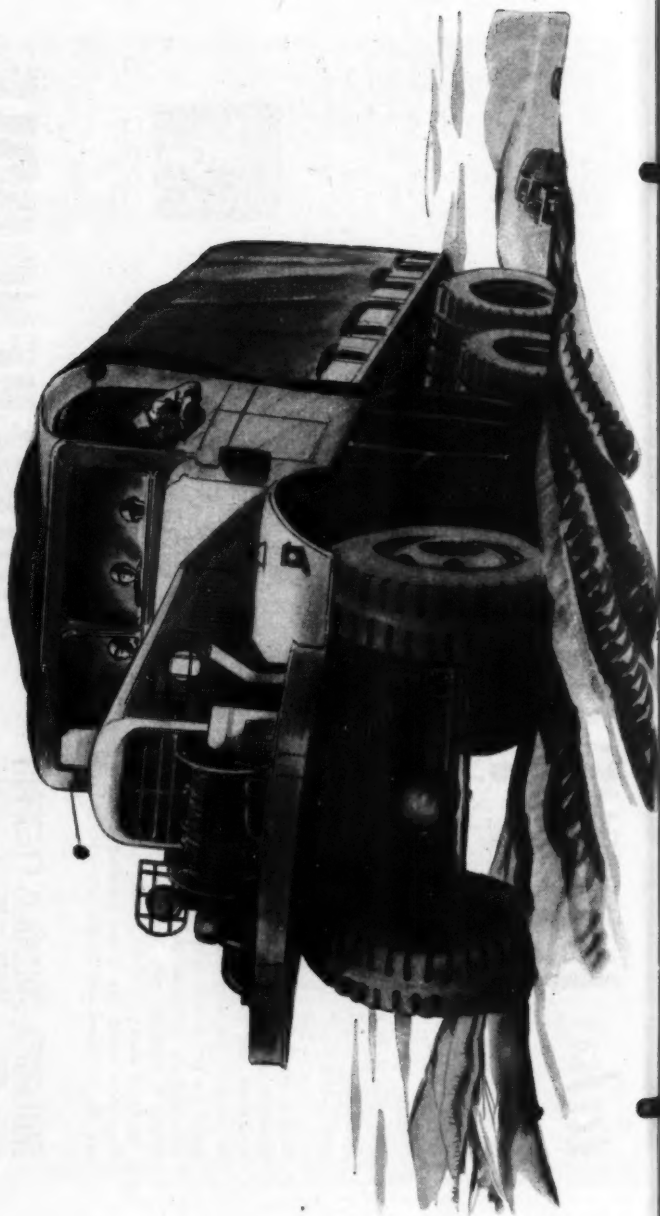
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A-P DEPENDABLE
Refrigerant Valves

An Army Moves On Rubber -as Well as its Stomach



May, 1943

4

THE REFRIGERATION

TODAY—The part that the refrigeration industry plays in feeding our armed forces is a matter of widespread knowledge. Not so well-known is the fact that refrigeration is being used extensively in the manufacture of synthetic rubber to insure a stronger, tougher and more uniform product. Thus, war-vital food protected by refrigeration every step of the way, moves over supply lines which roll on synthetic rubber tires, manufactured by processes using refrigeration. When synthetic rubber production gets under full steam, war workers turning out guns, ships, planes and tanks will be transported to and from their jobs on synthetic rubber. The refrigeration industry adds to its part in the drive for Victory.

TOMORROW—Synthetic rubber promises to be of utmost importance to all of us in the post-war world. Streamlined cars will move on synthetic rubber tires which will be virtually puncture and blow-out proof. Heavy air transports, both freight and passenger, will take off and land safely on synthetic rubber. Many articles used in the home previously made of natural rubber will be made from the new synthetic product. Countless new applications to contribute to our daily lives in convenience, comfort and health, will unfold themselves. The refrigeration industry will continue to do its part in the manufacture of "man-made" rubber.

"Detroit" refrigeration products are doing their bit for Victory all over the world. Wherever there is need for refrigeration or air conditioning, there you will find "Detroit" Expansion Valves and Controls. Today we are busy making many things, including refrigeration equipment, for all branches of our armed forces. Tomorrow we will again serve the refrigeration and air conditioning industries to the best of our ability.



DETROIT LUBRICATOR COMPANY

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SYNTHETIC RUBBER—

Another War Job for **ALCO VALVES**



Certain processes in the manufacture of synthetic rubber require large amounts of refrigeration—extremely low temperatures are necessary. To speed the production of this vital commodity, essential to our war and civilian economy alike, Alco is working closely with synthetic rubber makers in the development of special, low-temperature controls.

This is only one among many special war jobs for Alco Valves—others include valves designed

and engineered to meet the requirements of the U. S. Navy for surface ships and submarines, for merchant vessels, for low-temperature testing rooms in aviation plants, and other important industrial applications.

Again and again, Alco engineering experience and ability have been called upon to serve the War effort of our nation. When Victory is finally won, the result will be better and finer Alco Valves for all civilian uses.

ALCO VALVE COMPANY, 857 Kingsland Avenue, St. Louis, Missouri



Engineered Refrigerant Controls

THE STANDARD OF THE INDUSTRY

A NEW

Flaring Tool

**SEES THE
LIGHT OF DAY**



• In the new Imperial Self-Clamping Flaring Tool you spread the bar and insert the tubing in the proper opening. Then you close the bar, slide yoke onto hinged end of bar. Then just make the flare. The yoke itself does the clamping.



• "Mac" McIntosh (at the right), Chief Engineer, and George Franck, Research Engineer of the Imperial Brass Mfg. Co. discuss the new Imperial Flaring Tool that will still further simplify the job of making a flare.

ALTHOUGH the men in the Imperial organization are giving most of their time these days to the problems of applying fittings and other Imperial Products to various types of war equipment, you can be sure they are still thinking about the problems of the refrigeration field.

Quite recently "Mac" McIntosh and George Franck helped in the development of a simple, but important, improvement for an Imperial Flaring Tool to make it self clamping. In this tool there are no nuts, levers or other devices to be tightened for clamping

the tubing. It is easier and faster to operate than the previous style of tool.

We can't promise that you will be able to get one of these tools very soon but we do want you to know that Imperial research is being continued on all Imperial Products. When the critical material situation begins to clear up you will have new and improved Imperial Products to use in your work.

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STRAINERS • DEHYDRATORS • VALVES • FITTINGS • FLOATS • CHARGING LINES
TOOLS FOR CUTTING, FLARING, BENDING, COILING, PINCH-OFF AND SWEDGING

**FIRE ONE! ..
FIRE TWO!**



SINKING ENEMY ships almost within sight of Tokio—5,000 miles and more from their home bases—has become routine duty for American submarines, thanks to refrigeration and air conditioning. With food kept edible for as long as six months if necessary, and room temperatures which in the past rose well above the 100 mark, held to comfortable limits—these unsung heroes of the deep are performing miracles of offensive action—miracles which will be fully appreciated only after the war is won!

Submarine duty is just one branch of the service in which refrigeration and air conditioning is playing an important part in the fight for freedom. And, because the dependability of Henry Valves, Strainers and Dryers was so thoroughly demonstrated before the war, they have been requisitioned for the duration. That's why civilian needs must take second place until happier days return.

Henry Products are approved for Navy, Maritime Commission and Army Use



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Official Photo Courtesy
U. S. Army Air Forces

That's what America is doing — building for tomorrow so that when the boys come back from "over there" they will know that the folks at home have been in it too.

Today we at White-Rodgers are devoting our time and efforts to develop, design and produce controls for our Military and Naval Air Forces.

Tomorrow these wartime control developments will find many industrial and domestic applications to bring untold efficiency and comfort to a world at peace.



Series 1600 temperature controls and Series 1500 pressure controls also play an important part in wartime industry where reliability is a major factor.



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Controls for Heating • Refrigeration • Air-Conditioning



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Ranco Controls are compact in design with superior ability in maintaining accurate temperature settings over a long period of years. Field checks of thousands of installations show that they are practically troubleproof.

Ask your jobber about the available models.



The Refrigeration Service Engineer

Vol. 11

No. 5

May, 1943

A Monthly Illustrated Journal Devoted to the Interests of the Refrigeration Service Engineer in the Servicing of Domestic and Small Commercial Refrigeration Systems and Oil Burners

Official Organ
REFRIGERATION SERVICE
ENGINEERS SOCIETY

Cover

Big refrigeration room, recently installed in aircraft division of the Hudson Motor Car Company, Detroit. Henry Keller, custodian of the big 'ice box' hands Miss Margaret Disko an airplane part. Story on page 40.

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SERVICE ENGINEER

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KEEP 'EM RUNNING

THE old story of "a stitch in time" never had greater application than today...so important is the need for keeping all existing equipment running.

While practically 100% of Weatherhead facilities are devoted to production for Victory, we appreciate the fact that the home front is vital also, and as far as possible we are supplying this front with parts, fittings and accessories—to keep refrigeration equipment running. Call on us for what you need. We cannot make long-range promises, but will do our best to take care of your requirements.

THE WEATHERHEAD CO.
300 East 131st Street
Cleveland, Ohio



Refrigeration Valves, Fittings and Accessories

The Refrigeration Service Engineer

Vol. 11, No. 5

CHICAGO, MAY, 1943

\$2.00 Per Annum

News Briefs on Government Orders

Price of Used Equipment

METHODS of pricing used refrigerating and air-conditioning equipment of less than 25 horsepower, which is sold as part of the War Production Board program to convert such equipment for use in war industries, have been announced by the office of Price Administration.

The same pricing methods which were established in Amendment 68 to Maximum Price Regulation No. 136 (Machines and Parts and Machinery Services) for large scale refrigerating and air-conditioning equipment are incorporated in this order covering the smaller type equipment.

The action was embodied in Amendment No. 162 to Supplementary Regulation No. 14 of the General Maximum Price Regulation, which, effective May 1, 1943, provides that users of the smaller type equipment may resell it to the manufacturers on a basis of total installed costs less five per cent yearly depreciation.

Manufacturers may resell the smaller equipment on a reconditioned and guaranteed basis to a new user designated by the War Production Board at a price reflecting total cost of equipment to the manufacturer including dismantling, inspection, and shipping costs to the plant in addition to the costs for reconditioning, reshipment to the purchaser, and installation. To these costs, the manufacturer may also add out-of-pocket expenses incurred in the sale, plus reasonable charges for engineering and profit, not

upon the cost to the manufacturer but in the light of the manufacturer's risk and responsibility. However manufacturers' prices must be approved by OPA.

The present amendment also contains the same provisions with respect to the sales of the smaller type equipment when made by a state or its political subdivisions as were contained for large scale equipment in the amendment to Regulation No. 136, in which the states are allowed to use an appraised instead of fixed depreciation rate if approved by WPB.

Priority Applications to District Office

BEGINNING May 8, all applications for priority ratings under form PD-1A, must be filed with the nearest district office of the priorities division of WPB it was announced by Edmund H. Eitel, regional priorities manager. Formerly PD-1A applications had been sent direct to Washington for processing. This form is used chiefly for obtaining priorities assistance on capital equipment such as machinery, tools and metal products.

Under the new regulation, applications are screened at the district offices, then sent to the regional headquarters for processing. Regional offices now can process ratings calling for materials worth up to \$500. Previously regional offices gave ratings only up to \$100.

(Continued on page 42)

Service Pointers

Practical Service Men Tell How They Meet New Repair and Service Problems

UNDER this department a number of practical service men show a commendable cooperative spirit in passing on to others information on special repair and service problems that may be of much value in these trying times of material scarcity and shortage of competent help. We believe if more readers would send similar contributions, making THE REFRIGERATION SERVICE ENGINEER a medium for the exchange of information on service, much benefit would accrue to all. Similar contributions are solicited from all readers.

RECONDITIONING A CONDENSING UNIT FAN

By O. G. Benson*

IN regard to sticky and slow running Westinghouse condensing unit fans with three wire leads—white, black and red—they can be re-conditioned successfully in the shop. They will run on 110 volt, 60 cycle A.C. provided the red lead is furnished voltage in a 90° out of phase relationship with the white and black lead which constitutes the running windings.

To do this I remove the fan motor assembly from the unit and remove the screw plug in the side of the fan motor body. Using a pressure type oiler, I force into the fan body assembly a quantity of No. 20 oil mixed about five parts of oil to one of Zylene.

The upper sketch fully explains how to hook up the fan motor to 110 volts, 60 cycle A.C. By helping the fan along by hand until the lubricating mixture penetrates into the bearings 90 per cent of these fan bodies respond to the treatment and take right off. I usually find a fan will run better, and check better, after several hours of continuous running, hooked up as per the diagram, before returning to operation on the unit. Incidentally, to check a fan disconnect the current and time its coasting period. A good fan will coast 30 to 45 seconds to a smooth running stop.

*H. E. Saviers & Son, Reno, Nevada.

ANOTHER HINT ON SERVICING CONDENSING UNIT FAN

By Walter G. Wells*

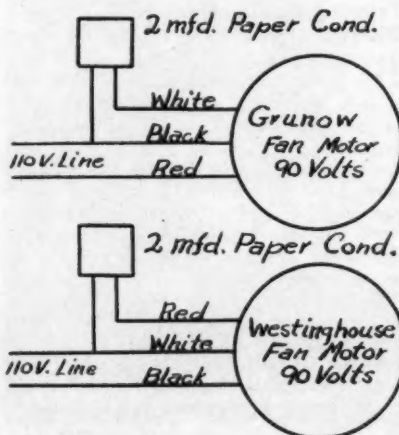
THE question has been asked how to make a Westinghouse fan motor run on 110 volts. I have had this same problem, but I found out how to do it so I will pass it along to others. You put a two microfarad paper condenser on the line and the other on the fan lead, as shown in the lower sketch.

*Refrigerator Service & Supply Co., Wilkes-Barre, Pa.

BELT SQUEAKS

THE practice of putting soap on a belt to stop it from squeaking is a harmful one because the ingredients of soap are likely to have a bad effect on the belt after a time.

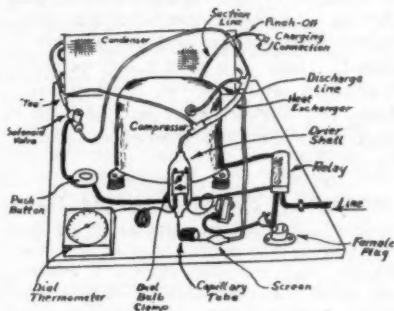
Castor oil or olive oil is the only good lubricants for belts. Never use mineral oils or products since these will tend to dissolve the rubber in the belt.



BUILDING A COLD CONTROL TESTER

By H. W. Custer*

THIS is a small, quick-acting refrigeration system designed to quickly pull down the temperature of a small evaporator and provided with a quick-acting defrosting system to raise the temperature to cut-in point. Besides testing cold controls it can also be used for various other control devices equipped with a gas-filled power element.



Homemade Cold Control Tester.

The compressor used is a Crosley sealed Freon job. A good-sized condenser is used and gravity cooling is employed, as air currents set up by the condenser fan would affect the reading of the thermometer.

A heat exchanger is made up of sweat tees and not only keeps the cooling where it is needed but adds to the condensation of the discharge gas.

The evaporator is made up of an empty household dryer and equipped with a dual clamp soldered thereon. A capillary tube ($\frac{1}{2}$ of a Crosley capillary) is the throttling medium and protected by a small dryer-screen.

For fast defrosting a solenoid liquid valve is tied between suction and high-side. A push button operates this valve.

A female plug socket is used for handy control plug-in lines. Several of these should be made up to fit the various controls, also one with clips.

Evacuation and charging was made through a connection in the suction line. This is later pinched-off and plugged. The machine is charged with a few ounces of Freon.

*Shop Foreman, Mercier & Clark, Inc., Detroit, Mich.

An accurate thermometer must be used. The dial type is easier to read but a convention type can be used.

To test the machine for accuracy, plug in a new control with a fixed setting. The machine will start when it is plugged in. The control will stop it when it cuts-out. If the thermometer reading tallies with the control setting the machine performs O.K.

COMMENTS ON NOISY GRUNOW

By Leo W. Minikus

I HAVE read with interest the comments in the February issue on a noisy Grunow. Having been service manager for a Grunow distributor I am well acquainted with the service problems of this equipment.

The 1933 and early 1934 models did not have a buffer spring behind the vanes. They had five small composition pegs. The pegs as well as the buffer springs are applied to the vanes for one purpose only, to make the compressor start quietly. As the compressor starts the vanes recede into the slots in the rotor and unload the compressor for starting. As the motor comes up to speed the vanes fly out against the pump body and the compressor picks up the refrigeration load. We had so much breakage on these springs that we began removing all of them in the fall of 1934 and it cleared our problem of stuck and scored compressors. You can readily see that the buffers have no effect on the efficiency of the compressor.

The chattering noise was a bug that showed up every time we had a few cool days and started with the 1935 model. We found this to be nothing more than an improperly purged machine, having a slight amount of air left in at the factory. The explanation of the noise is rather simple. During the off cycle the low and high side pressures balance and you lose the liquid stop you have in the capillary during the on cycle, allowing the air to pass into the evaporator. As the air is lighter than carbon vapor it is drawn from the evaporator at the start of each cycle and causes a chattering noise as it passes through the compressor.

We always received these complaints on cool days and the only theory I could advance would be that the longer off-cycle would give the evaporator time to pick up a good volume of air, that is, enough to cause the chatter where it would not do it on a hot day.

REPAIRING CHECK VALVE

By E. F. Rhodes

RECENTLY I was called to service a General Electric household refrigerator (rotary compressor type) and among other things which were bad was the check valve located in the suction service valve. The old valve was beyond repair and I was unable to obtain one locally, so I decided to try to make one.

I used a $\frac{3}{8}$ by $\frac{3}{8}$ -inch flare union and reamed half way through from one end with reamer large enough to make a good seat for a steel ball which was slightly larger than the newly reamed hole. I faced the seat with a rod (steel) the same size as the steel ball. This rod was turned down on one end until it was as nearly as possible the same radius as the steel ball. I then placed a light spring against the steel ball, held in place by a ring cut from a spring slightly larger than the reamed hole and washer ground to fit inside reamed hole. A groove was turned on inside near the flare end to hold the retainer ring.

This valve is working very satisfactorily. It was installed in the suction line near the suction service valve.

OPERATION OF THERMOSTATIC EXPANSION VALVES

By Frank R. Bader*

WE HAVE had considerable trouble with erratic operation of thermostatic expansion valves. It seemed at first to be a moisture condition, and we would wash out the valve with carbontet, and heat the body of the valve to make sure it was dry and also install new dehydrators, but found that within a day or two the same condition would prevail, this incidentally happens on valves with a metal housing around the bellows.

We found that water condenses inside the casing around the bellows, sometimes filling this casing over half full and freezing when the unit is in operation, this causing the valve to freeze open or closed, and either spilling raw liquid back to the compressor or not feeding any liquid at all.

We have tried punching holes in the casings and removing the water and this has resulted in clearing the trouble in most cases but we have had to change valves in some cases.

*Bader's Sales & Service, New Brunswick, N. J.

HELPI HELPI

SHORTAGES of materials have created many new problems for the service engineer which in turn create many new questions, answerable only from practical experience in the field. Readers of this journal have submitted the following questions on which they would like to have information as to what others are doing. Answers to these questions are solicited from readers and will be published. Those who have questions are invited to send them in. Both questions and answers in regard to such problems will be published as received.

REPAIRS TO CONTROLS AND VALVES

Can you furnish me with repairing information to service all types of pressure controls, cold controls, automatic expansion valves, and thermostatic valves; and the name of the company from whom I may be able to buy the parts to service these valves?—I. B.

REFINISHING DOMESTIC EVAPORATORS

Can you advise a successful method of refinishing steel flooded type, shell type domestic evaporators that have, either by the action of acids or old age, lost their bright finish? I have tried thoroughly cleaning the outside of these evaporators and retinning them by dipping into a suitable flux and then in a bath of pure molten tin. This produces a satisfactory finish, but after being back in service a few weeks the entire surface begins to show tiny rust spots and after a short time its condition is as bad if not worse than before. I would be pleased to have comments on the above problem, also recommendation for reconditioning these evaporators with a fair degree of success.—W. S.

RUBBER DOOR GASKETS STICK

What can be done to prevent old rubber door gaskets from sticking to the door frame? How about using Simonize polish on the door frame?—C. B.

REPAIRING BROKEN HARDWARE

How may broken hardware be repaired without new parts? If it can be silver soldered, please explain in detail.—E. D.

The Construction of Compressor Bodies

(CONTINUED FROM APRIL ISSUE)

NOTE: This is the third of a series of articles on the Construction of Compressor Bodies designed to give service men a more complete understanding of compressor construction and how to dismantle and assemble them for repairs and adjustments. The compressors described in these articles are made by the Williams Oil-O-Matic Heating Corp., Bloomington, Ill. The construction details and principles, however, apply to other makes.—Editor.

Compressor Body No. RC-490

Compressor body No. RC-490 (Fig. 12) has a bore of $2\frac{3}{8}$ -inch, stroke of $2\frac{1}{2}$ -inch, four cylinder, and is used on Models V and W compressor units.

Crankshaft and Connecting Rods

The crankshaft in this compressor body is of one-piece forged steel construction with all bearing surfaces ground to fit. The shaft is drilled for force feed lubrication to all connecting rod and main bearings. (See Fig. 18.)

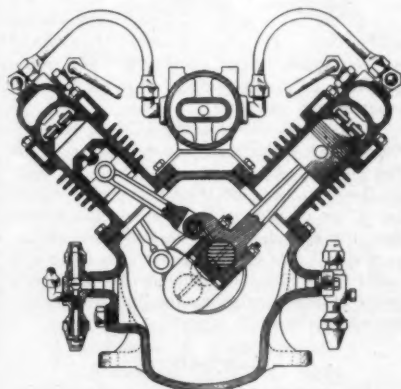


FIG. 12.

The connecting rods on one side are linked onto the connecting rods on the opposite side, only one rod of each pair connecting directly on the crankshaft. However, each piston travels the same length of stroke.

Access to connecting rod bearings is accomplished through the removal of the cylinder blocks.

Oiling System

The oil pump rotor (Fig. 13) is connected to and turns with the crankshaft. A piston is constructed in this pump rotor and the end of this piston is held by a spring against the inside of an eccentric ring surrounding the rotor. This eccentric ring causes the piston to reciprocate when the rotor assembly is turned by the shaft.

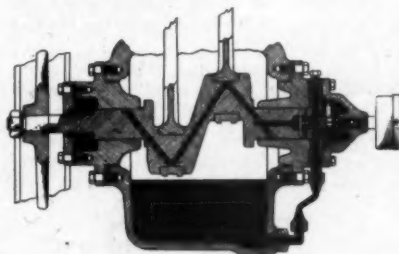


FIG. 13.

In the course of travel, a port in this rotor makes contact with an intake port and an outlet port in the pump housing. The action of the piston is timed with the porting and the suction created by the pump draws the oil from the crankcase and it is then discharged to the oil channel in the crankshaft. The escape of oil being restricted at the bearings, oil pressure is built up by the pump forcing the oil under pressure to the bearing surfaces. The maximum pressure is controlled by an automatic by-pass which is adjustable. This by-pass should be set at 18 to 22 lbs. above the crankcase pressure. The pressure pumped is the difference between the pump gauge reading and the pressure in the crankcase.

To adjust pressure, remove plug in bottom of pump housing and turn counter-sunk screw, turning clockwise to increase pressure.

When the oil is saturated with methyl chloride, the oil pressure will be reduced possibly to less than five pounds. However, after the compressor has operated for a time and the oil gives up the methyl, this pressure should increase to the maximum setting.

Piston Valves

Methyl chloride vapor enters the cylinder chamber through a poppet valve in the head of each piston. Details concerning this valve assembly have already been given.

Compressor Discharge Manifold

The compressed methyl chloride vapors are discharged into a manifold located between the cylinder blocks which in turn is connected to the liquid receiver. This manifold is water-cooled, the water passing through the outer chamber.

Lubrication

The lubrication of the connecting rod and main bearings is discussed under the heading "Oiling System."

The cylinder walls and wrist pins are lubricated by spray from crankshaft bearings.

Three and one-half pints of oil are required for this compressor body.

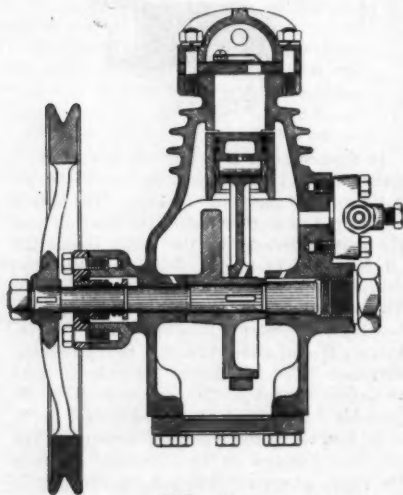


FIG. 14.

Compressor Body No. Y-77

Compressor Body No. Y-77 (Fig. 14) has a bore of $1\frac{1}{4}$ -inch, stroke of $1\frac{1}{2}$ -inch, single cylinder, and is used on Model Y compressor units prior to August, 1932.

Crankshaft and Connecting Rod

This compressor body is equipped with a drop forged crankshaft and all bearing surfaces are ground to size. This shaft is counter-balanced but the counter-balances are forged integral with the shaft, affording one-piece construction.

The crankshaft is kept in alignment by a bronze thrust bearing at one end and the compressor seal spring at the other end.

The connecting rod is cast iron and the removable cap is held in place by two cap screws. Should it be necessary to disassemble the connecting rod, it is important that the cap screws be wired together after reassembling, so as to avoid possible damage which might result due to their becoming loose.

The connecting rod is not babbitted or bushed, making a cast iron bearing against the steel shaft.

Crankcase and Cylinder Block

The crankcase and cylinder block in this compressor is cast in one piece. Access to the connecting rod bearing is gained through the removable plate on the bottom of the crankcase. The entire connecting rod and piston assembly can be pulled out through this opening if the crankshaft is first removed.

Piston and Piston Liner

The piston is cast iron and is equipped with rings. It is not constructed with a suction valve, as ports are provided for the entrance of methyl chloride vapors into the compression chamber.

A cast iron liner is pressed into the cylinder block and affords the cylinder wall for the pistons. Ports spaced around this liner at the lower end of the compression chamber allow passage of methyl chloride vapors into the cylinder chamber when the piston is at the lower end of the stroke. The cylinder block is so constructed that there is a space entirely encircling the liner sleeve surrounding the suction ports.

Lubrication

This compressor body is not equipped with an oil separating device. Consequently, the

cooling coil used with this compressor must be constructed with a pan-type float mechanism or other arrangement to afford proper return of lubricating oil from the cooling coil to the compressor crankcase.

The crankshaft is lubricated by dipping through the oil supply, and the cylinder wall and wrist pin are lubricated by splash.

An oil gauge plug located in the side of the crankcase determines the oil level. One and one-eighth pints of oil is required to bring the supply of oil up to this level.

Compressor Body No. Y-77A

Compressor body No. Y-77A (Fig. 15) has a bore of 1-5/16-inch, stroke of 1 1/2-inch, single cylinder, and is used on Model Y compressor units beginning September, 1932.

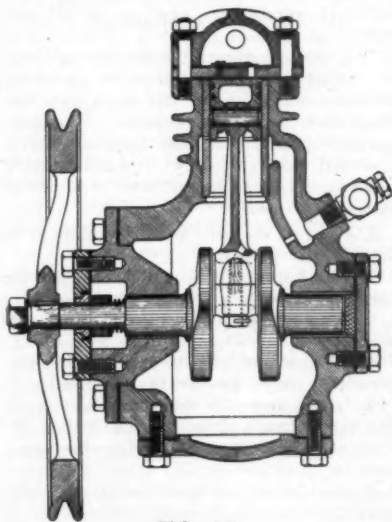


FIG. 15.

Cylinder Block

In this compressor body, the cylinder block and liner is of one-piece construction. It is so designed that there is a space surrounding the lower part of the cylinder wall, and inasmuch as this space is a part of the crankcase, in operation it contains low pressure methyl chloride vapor.

A removable plate on the bottom of the crankcase permits removal of eccentric, and piston and eccentric strap assembly.

Eccentric Shaft Assembly

The eccentric shaft and the counter-balanced eccentric are two separate parts, the

former being made of steel and the latter, cast iron. These parts are machined to assemble as a press fit and consequently must be assembled or taken apart with the aid of a press.

A half-moon key is used to prevent any possibility of the eccentric turning on the shaft. This key requires special attention when installing or removing these parts.

In assembling the compressor body, the piston and eccentric strap must be assembled and the strap assembled on the eccentric. Slip this assembly through the bottom of the crankcase, installing the counter-balance side of the eccentric toward the compressor seal. Insert the shaft through the crankcase simply to hold the eccentric in place. Before installing, however, it is necessary that the halfmoon key be inserted in the seat in the shaft. A clearance groove in the top of the crankcase bearing is provided to allow passage of the key.

Then turn the eccentric and align the key-way with the key on the shaft by observation through the oil groove in the bearing at the seal end of the shaft. The shaft can then be pressed into the eccentric, the shoulder on the shaft serving as a stop.

In case the shaft must be removed the key must, of course, be in line with the clearance groove in the bearing. The key-way in the shaft for the compressor pulley key is exactly in line with the eccentric key. Therefore, turn the shaft so that this key-way is turned toward the cylinder head. The shaft can then be pressed out of the eccentric.

Compressor Seal

The compressor seal is of the rotating steel ring and stationary bronze seat type.

Piston Assembly

The piston is cast iron and is equipped with two piston rings.

There is no suction valve in the head of this piston as the methyl chloride vapors enter the cylinder chamber through ports in the cylinder wall.

The wrist pin is held in place by a retaining ring at each end.

Lubrication

The eccentric shaft assembly operates in a bath of oil. The cylinder and wrist pin are lubricated by splash.

The oil gauge plug on the side of the crankcase determines the oil level in the compressor.

One pint of oil is required to obtain this level. (To be continued in June Issue)



Paul B. Reed, Evansville, Ind.

The Coming Crisis in Refrigeration Service Engineering*

By Paul B. Reed

Service Manager Electric Refrigeration and Air Conditioning Division, Servel Inc., and Chairman War Educational Committee, R. S. E. S.

IT is natural for each industry, trade and profession to over-rate its importance to the national welfare. This is not due to selfishness but to the fact that each is more familiar with his own activities and how they interlock with the overall picture than he is with the other fellow's problems. He sees his work as essential to the general war effort but he forgets that he is but one link in a chain and that the other links are as essential as he.

Essentiality and non-essentiality are not always sharply recognizable. The worker directly building a plane is no more essential than several other workers behind him who make it possible for him to build that plane. The workers in the mines, the lumber camps, oil fields, steel mills, the farms, the railroads, the trucks, machine shops, and many other industries must produce, transport and prepare the material before he can build it into the plane, and they are also war workers just the same as he is. All these war workers must be fed, they must be housed and kept warm in the winter; they must have medical care, they must have mass and individual transportation facilities to get to and from work. All these activities and many more are bound together and interwoven into the great war effort. A breakdown in any one of these activities can and will disrupt the entire effort. If there appears to be a breakdown impending in any of the essential activities, every effort should be made to avert it, lest its failure reduce the number of shells, planes, tanks, ships and other war material going to our men or our allies on battle lines.

* Presented at Refrigeration Industry Wartime Conference, Chicago, Ill., April 14, 1943.

The Service Situation

It is no secret that the service phase of our industry has been hard hit by the necessities imposed by war. Let us examine the situation with as little prejudice as possible, bearing in mind that essentiality is relative and that many industries and many needs are drawing from the national stock pile of men and materials:

1. Just how essential is refrigeration service to the war effort?
2. How badly is it hurt and what are the causes?
3. What steps have been taken to overcome these causes?
4. What effect will its inability to completely do its job have on the war effort?
5. What else can be done to undo some of the harm already done, prevent further deterioration and improve refrigeration service?

Essentiality of refrigeration service seems scarcely debatable to us who realize the extent to which the nation's food supply depends upon mechanical refrigeration and how necessary prompt and capable repair and maintenance is to continued and dependable operation of the equipment. If, overnight, repair and maintenance facilities were wiped out, chaos in the food industry would result. Thousands of tons of perishable foods would be lost, there would be wide-spread damage to public health, disruption to many lines of war effort and thousands of lost hours. Shortages of manpower and diversion of materials to the implements of war require that the nation must get along with its old machines. These are getting older and more worn day by day,

some are being kept in operation by frequent repair, although in ordinary peace times they would be replaced with new equipment.

High officials have recently been stressing the necessity of conserving our food supply and limiting its consumption. Rationing has forcibly brought this to the attention of each of us. The farmers are being urged and helped to raise more food. To raise more food, to conserve it, to limit its use are futile if it is allowed to spoil thru lack of facilities to preserve it. In addition to keeping the machines running that preserve the nation's food, in hospitals, institutions, groceries, markets, restaurants, dairies and in homes, the refrigeration service engineers are charged with the responsibility of servicing the many refrigerating installations for industrial processing in war plants—coolant coolers, metal "cold" treatment, rivet cooling, aluminum sheet cooling, instrument testing, spot-welder tip cooling, etc. Refrigeration equipment for blood plasma processing and preservation must also be serviced. These are extremely important uses of refrigeration and must be kept running.

In order to determine to what extent the ability of the service engineers to handle the situations has been impaired, the Refrigeration Service Engineers' Society sent out a questionnaire to each of its 65 chapters in the United States and three in Canada, and the data thus collected is quite startling and even dismaying. Please bear in mind that the replies were compiled by officers of the chapters and may thus be considered reasonably accurate for their areas. Every section of the country is represented and a summary of the individual replies is a close estimate of the situation nationally. The situation may be considered from three angles—materials, transportation, and manpower. Of the three the latter is by far the most serious.

The material problem may be considered from two angles—the commercial and industrial equipment and household refrigerators.

Order P-126 Issued

After a long delay initially, due partly to causes that were beyond the control of the War Production Board, Order P-126 was issued. It was designed to aid the service man to get material and parts for commercial and industrial refrigeration equipment of an essential nature, with as little delay

and "red tape" as possible. Under that order "Authorized Service Agencies" were appointed and to them was delegated authority to apply priority ratings to their orders for material and parts to suppliers and manufacturers. This was a very liberal and almost revolutionary step and has been of tremendous value to commercial refrigeration service.

As the ability of the original priorities A-1-A, A-3 and A-8 to obtain parts was affected by rising priority ratings the order was amended to provide ratings of AA-2X, AA-3 and AA-4. Even with these ratings tools are very difficult to obtain and the type of solder available under the order is unsuitable for a permanently gas-tight joint. The survey indicates that 86 per cent more material and parts are needed for refrigeration service, but there is a very critical shortage of many materials, copper, tin, steel, chromium, etc., and we can not expect to get all the material or parts we want, and generally speaking these new ratings do enable the Authorized Service Agency to get material and parts reasonably promptly.

The survey shows that, of the established service agencies deemed capable by the chapter officers, only 72 per cent hold certificates under P-126. This is perhaps due to some misunderstanding as to who is eligible to receive the certificates. It is not necessary for a service man to be on one of the lists submitted by the manufacturers to the War Production Board, in order to get a certificate, but it is necessary that the service man apply to the Refrigeration and Air Conditioning Section using Form PD-399.

It is my understanding that a large percentage of those to whom the War Production Board sent application form PD-399 have not made application for a certificate. Regardless of any previous experience a service agency may have had and regardless of what previous understanding they may have had, they should immediately file an application form PD-399 if they do not have a certificate. The Refrigeration and Air Conditioning Section has been very cooperative toward the service engineer and it is my belief that they will be most liberal in considering the application. May I repeat this: If a service agency, whether a company or a single individual rendering service on commercial or industrial refrigeration equipment, does not have a Certificate of Authority under P-126 they should apply at once, using form PD-399.

It should be remembered that P-126 deals with commercial and industrial refrigerating equipment only, and makes no provision for domestic refrigerators. The manufacturers of mechanical refrigerators for homes had fairly heavy stock of repair parts but these have been steadily drained and there is evidence that within the next few months shortages of essential repair parts for home refrigerators will be more pronounced than at present.

Tire and gasoline proved to be serious obstacles to continuance in business by refrigeration service engineers but happily these troubles have been relieved to some extent, except in certain sections where the individual tire and gasoline boards are unusually difficult. Many of the small communities have lost all their refrigeration service engineers and must depend on getting service from nearby large cities. This has made longer trips necessary for the remaining service engineers and the reluctance of some of the local gasoline and tire rationing boards to grant the refrigeration service engineer sufficient gasoline and tires has left some of the smaller communities without hope of getting service even on equipment used by markets, dairies, farm milk producers and other essential activities.

The Copper Order M-9-C has recently been revised and the revised order offers some relief in obtaining repair parts made wholly or partially of copper or copper base alloys that are used in essential installations.

The survey was taken several weeks ago and since that time there have been some events that have conspired to change the situation, chiefly for the worse, such as the pressure that is being put on to get men into direct war work. The figures taken from the survey, black as they are, may therefore be taken as quite conservative and not fully reflecting the seriousness of the situation at present. They show that 15 per cent of the service engineers have gone into military service and 23 per cent have gone into industrial plants and maintenance in military camps and bases, making a total of 38 per cent of the service men no longer available for civilian work. This is bad enough, but it is not all. Since certain new or factory rebuilt parts or complete assemblies are not available, the service engineer has been forced to spend extra time in repairing them. The survey shows that this activity is taking 30 per cent of his time. So that 30 per cent of the time of the 62 per cent of the men left is spent in work that he

did not have to do before the war. Therefore, the 62 per cent available manpower shrinks to the equivalent of 43 per cent.

Service Men Leave Industry

Several factors have conspired to take service engineers out of the industry. In the early days many went to army camps and air fields then under construction where some erected copper tube lines used for distribution of water and gas. Others went into electrical, plumbing or other construction work. Some of these returned to the industry but many stayed as civilian maintenance men. Many went into war plants because of various reasons; difficulty in obtaining material, parts, tires and gasoline; shorter and more regular hours and in most cases higher pay; less responsibility and worry; and greater security from induction into military service.

Many of them went into work for which they were not specially trained or qualified—perhaps an assembly line job in which they could become proficient within a few weeks or even days. But the refrigeration industry lost a trained man, one who is almost impossible to replace.

In December 1942 the Selective Service System issued Occupational Bulletin Number 42 on the subject of "Repair and Hand Trade Services" in which the essentiality of the refrigeration service man is put on the same level as many other trades such as auto body, repairman, electric appliance service man, furnace installers and repairman, oil burner installer and serviceman, roofer, upholsterer, and others of somewhat more essential nature. This bulletin merely classifies refrigerator repairmen as eligible for occupational deferment but the local board may ignore his occupational status and induct the man if they see fit.

Experiences of refrigeration service engineers reported to us throughout the country indicate that the local draft boards do not realize the importance of keeping essential refrigeration equipment in operation and how badly the service industry is already under-manned. Nevertheless an employer of refrigeration service men should immediately file form 42A for reclassification and deferment of men who are classified 1A, and for men classified 3A the employer should file form 42B which gives the employer 15 days in which to file 42A if the 3A man is reclassified to 1A. These forms should be filed now regardless of when the

probable date of call of the man is expected.

Many service engineers do not work for an employer but operate independently for themselves and so have no one to file deferments for them. However, they can file these forms themselves as their own employers. If the local board refuses to reclassify the man he can then appeal the decision of the local draft board. This appeal goes first to the district appeal board and if the appeal is refused the inductee can appeal to the state appeal board. If they too refuse deferment an appeal can be made to the War Manpower Commission who can give deferment but they are unable to act until the district and state boards have passed on the appeal.

It is my personal belief that the refrigeration service engineer will find the War Manpower Commission more inclined to give him deferment than either the local draft board or the appeal boards, but he must go through them before he can obtain a hearing before the War Manpower Commission. In filing with the local board or in appealing to the district and state appeal boards and the War Manpower Commission the man should include a photostatic copy of his Certificate of Authority under P-126 showing that the War Production Board regards Refrigeration Service as so essential that they have delegated government authority to him to apply high priority ratings.

Separate Status Requested

It is the recommendation of the Refrigeration Service Engineers Society that refrigeration service be given a separate status on a similar plane of essentiality as the skilled farm worker and that teeth be put into the order to the local boards requiring that the refrigeration service engineer be deferred if he is (1) a skilled man with experience of at least two years, (2) irreplaceable in that community, (3) necessary to the continued operation of essential industrial, commercial and domestic mechanical refrigeration in that community.

The questionnaire asked what percentage of commercial and domestic refrigerators will become inoperative during June, July, and August 1943 due to lack of service facilities (including lack of material and reduced manpower). The average of the replies is 18 per cent for commercial and 32 per cent for domestic. In other words approximately one out of five groceries, markets, restaurants, etc., are expected to be

down for an extended period during the hottest weather and one out of three homes will be without adequate refrigeration for an extended period.

When the survey was made some few weeks ago (and in the winter time, which is the slack season for service) the average service agencies were two weeks behind on their service calls. It must be much worse now, and will be still worse in July and August.

The survey indicated that service agencies would be able to handle only about 65 per cent of the work this coming season. This means that with service men working even longer hours than during peace times (70 to 90 hours per week are common), about $\frac{1}{2}$ of the service just won't get done.

The percentages given above are nation wide averages. In many areas the figures show a far worse condition. Many of the replies cited cases of breakdowns last summer that resulted in a great deal of food spoilage, too numerous to be repeated here, but indicating food loss, impairment of public health and loss of work hours of alarming proportions this summer unless something is done quickly.

Service Man Reports

A letter just received at International Headquarters from a service engineer in a small community in Ohio is so typical of many reports on the desperate condition of refrigerating service and describes it so well that I shall quote extracts from it:

"My brother and I have operated a service business for the past ten years . . . We employed five men besides ourselves; however, today we are struggling along with two. One of our men left us to go into a war plant and the other two were drafted and to this date we have been unable to replace them. We happen to be the only refrigeration service organization in this section. At one time we operated in 17 counties but the lack of competent help along with restrictions on gas and tires has compelled us to make drastic reduction in the territory covered.

"At present we have only one man on the road (this happens to be my brother). He takes care of commercial and industrial equipment only. We have several plants in our territory that are doing 100 per cent war work. He services their equipment including oil coolers that we have installed to speed up production. Also there is a considerable amount of equipment in slaughter

houses, dairies, farm milk coolers, farm frozen food cabinets, meat markets, restaurants, hotels and grocery stores that he services. We have to turn down all household and non-essential commercial equipment as we cannot possibly take care of it.

"My brother and I work night and day seven days a week except for a few hours' sleep so that we can keep going. The only way that we are able to take care of household equipment is for the customer to bring it into our shop. They come in from miles around with their refrigerators in trailers or, tied on the back end of the car or most any way that you could imagine . . .

"We have a draft board that is not refrigeration minded. They carry the opinion that we used to do without refrigeration and we still can if necessary . . . They do not seem to realize what effect it will have on the war effort as well as the morale of the people if there is no refrigeration service available in this vicinity. At the present time my brother is to be inducted in May and two more of us will follow very soon if we can not show the draft board that our business is important in the war effort. We have used every means we know of to try to explain to them but so far we have accomplished nothing except they tell us if we can convince them our business is essential they will be willing to reconsider . . .

"We are very willing to go into the service if we are needed there more than on the home front. However, it seems to us that our draft board doesn't realize the importance of the refrigeration industry as a whole . . . They have no conception of the amount of essential service we take care of."

This is not an isolated case. Many similar ones have been reported. It is simply a typical and well stated case.

Refrigeration service is a peculiar trade. The refrigeration service engineer must be somewhat of an electrician, plumber, carpenter and all-around mechanic, plus having a highly specialized knowledge of refrigeration processes, properties and circulation of air and some knowledge of the products he deals with—foods, beverages, etc. A beginner is just in the way for the first six months, and two years' experience is the minimum for domestic service and double that for diversified commercial service. Thus the refrigeration industry must depend on and keep our men and if possible get back some of those lost to other activities.

In considering what can be done to help this situation we should first be sure that we

service men are doing everything we can to work most effectively. Here are a few suggestions that may help:

Suggestions for Help

(1) Do the most essential service first; blood plasma, hospitals, industrial processing, wholesale and retail food storage, dairies, institutions and homes, and then if there is any time left, water cooling, beverage cooling, comfort air conditioning and similar less essential installations.

(2) Plan your work so as to avoid loss of time in back-tracking.

(3) Carry plenty of tools with you so that you will have the right tool for the job, and so you will not have to go back to the shop for a necessary tool. Keep your tools in good condition.

(4) Try and anticipate, insofar as it is possible, what material or parts you will need on a service call, and if possible pick up material for several repair jobs on one call at your jobbers.

(5) Require of your customer that he give you as much information over the phone as he is able. It may save you a trip entirely or an extra trip to the shop for parts.

(6) Use unskilled help wherever possible, to save the time of skilled mechanics.

(7) Refuse calls for noisy operation or similar minor reasons unless it appears that the equipment may be further damaged.

(8) Use recording pressure gauges if you have them. They save time by showing you what has happened over a period of hours instead of your losing time watching the operation.

The lack of skilled refrigeration service engineers is beyond the critical stage, and further depletion of the already insufficient manpower will have grave consequences on the national well being. But even retaining the present personnel is not enough. Those who have left for other activities must be attracted back. A flow of farm labor has now turned back to the farm as a result of deferring skilled farm labor. The same will be true of the skilled refrigeration service engineers who can be of most value to the war effort by returning to the work in which they are experienced and in which they are desperately needed, if the Selective Service System will recognize the urgency of the situation and liberalize its attitude toward induction of refrigeration service engineers.

(Continued on page 40)

Refrigeration Industries Hold Wartime Conference in Chicago

AN IMPORTANT wartime conference of the refrigerating industry was held at the Palmer House, Chicago, April 13 and 14. The conference was devoted largely to consideration of availability of refrigeration parts and equipment and the situation under Government war regulations. It was planned and directed by the Refrigeration Equipment Manufacturers Association, the National Refrigeration Supply Jobbers Association and the Refrigeration Service Engineers Society.

Following separate sessions of the manufacturers and jobbers Tuesday, a joint meeting of all three Associations was held Wednesday morning, at which reports were made by the manufacturers and an important paper was presented by Paul B. Reed of Servel, Inc., and chairman of the War Education Committee, R.S.E.S. on the coming crisis in refrigeration service.

Two luncheons were held by the Jobbers, Tuesday and Wednesday, at the second of which a paper on parts and supplies for the industry was presented by Sterling F. Smith, chief, Refrigeration and Air Conditioning Section, WPB.

The conference was well attended, more than 200 being present at the various sessions. Probably the most outstanding contributions were the two papers presented by Mr. Smith and Mr. Reed.

Manufacturers Meet

The meeting of the Refrigeration Equipment Manufacturers Association was held Tuesday morning, John Wyllie, Jr., president, presiding. Reporting on its activities, he said the Association had given its best efforts toward prosecution of the war. Effective work, he said, had been done in handling Government contracts, in detailing the needs of the industry to regulatory bodies and in assisting industry units in the face of wartime difficulties.

The work of the Refrigeration and Air Conditioning Industry Advisory Committee was described by A. B. Schellenberg of St. Louis. He sketched the development of the

Committee through three stages; as an audience, a group of critics, and an advisory unit. At first its principal function was to analyze and criticize orders and rulings after issuance. This was necessary because of lack of opportunity to discuss policies in advance of issuance of orders by WPB.

It is now progressing toward real advisory status, changed to meet widened responsibility. Mr. Schellenberg said the committee wishes to continue to be really representative of the industry and requested that it be informed on all problems and needs as they develop.

C. M. Cordley, of New York, explained the work of the Product Group Task Committee. His subject was the program and activities of the water cooler group to secure recognition of the essentiality of self-contained water coolers in wartime.

The various orders affecting the refrigeration industry were discussed informally by Sterling F. Smith, chief of the Refrigeration and Air Conditioning Section, WPB. Principally these are four in number: L-38, L-126, M-28 and P-126. Because the refrigeration industry includes many different companies and phases of material operations, Mr. Smith declared that it is fortunate the R.E.M.A. brings them together for the benefit of the group as a whole. In a like manner the refrigeration orders take the industry out from the scattered effect of numerous orders and industry operations are simplified as a result.

Discussing the reason for the various orders in the refrigeration field, he pointed out that they not only save material from a large volume of specialties previously manufactured, but also release much productive capacity for direct war work.

The plans of the National Refrigeration War Council were described by Mr. Wyllie. The Council will act as a coordinating group which will give its assistance to solving general problems of the refrigeration industry as a whole. In addition, it will give its efforts to placing the facilities of the refrigeration industry in line for more effective service in the prosecution of the war.

The Controlled Materials Plan was explained and discussed by W. S. Vaughn of that division in WPB. Basically, he said, CMP involves a choice of end products followed by allocation of all materials necessary for their completion.

Pointing out that the Controlled Materials Plan not only provides a method for more effective production of heavy war goods, Mr. Vaughn called attention to the more efficient distribution of maintenance, repair and operating supplies under CMP Regulation 5. He suggested this regulation be studied so that advantage could be taken of the preference ratings it offers for use in the various industry classifications.

The report of the Nominating Committee, which named seven new directors, was presented by B. J. Scholl, chairman. Officers elected and directors serving for the ensuing year are as follows:

Officers

President, R. H. Luscombe, Penn Electric Switch Co., Goshen, Ind.

Vice-president, A. B. Schellenberg, Alco Valve Co., St. Louis, Mo.

Secretary, F. J. Hood, Ansul Chemical Co., Marinette, Wis.

Treasurer J. A. Strachan, Kerotest Manufacturing Co., Pittsburgh, Pa.

Directors: Ivan Corcoran, Square D Co., Detroit, Mich.; George R. Allen, Mueller Brass Co., Port Huron, Mich.; A. R. Benua, Ebco Manufacturing Co., Columbus, Ohio; T. C. Davis, Dayton Rubber Manufacturing Co., Dayton, Ohio; E. M. Flannery, Bush Manufacturing Co., Hartford, Conn.; Harry Jarrow, Jarrow Products, Chicago, Ill.; R. F. Moody, Wolverine Tube Division, Detroit, Mich.; J. W. Krall, Detroit Lubricator Co., Detroit, Mich.; and M. B. Williston, Acme Industries, Jackson, Mich.

Product Group Meetings

Tuesday afternoon a series of product group meetings was held by the manufacturers. A number of questions prepared as a result of a questionnaire sent to the refrigeration supply jobbers were discussed and answers proposed for presentation at the joint meeting Wednesday morning.

Meeting of Jobbers

THE jobbers meeting convened Tuesday morning under the direction of Alex H. Holcombe, Jr., president. Mr. Holcombe pointed out that previous meetings with manufacturers had been most profitable and he felt that this one would be also.

Sterling A. Warren of the Industrial and Hardware Suppliers Branch, War Production Board, gave a talk on obtaining material on PD-1X application. Mr. Warren pointed out that increased demand for refrigeration will create increased calls for service, and hence needs for material.

He struck a new note of optimism in regard to obtaining materials for essential service work in the refrigerating industry. Although it had been necessary to sharply curtail critical materials in the past, it is recognized that an increased demand for refrigeration as summer weather approaches will increase calls for service, and hence the needs for material. Because of this, he said, Washington is becoming more and more sympathetic to the needs of the industry.

However, he explained that because of the number of applications received and a limited personnel, it would not be possible to process them as received. He therefore suggested that they cultivate an attitude of patience. He closed with the assertion that while the armed forces would continue to come first in critical materials, his office in the WPB would see to it that the refrigeration service industry gets essential equipment to carry on its business.

Following Mr. Warren's talk, the meeting was opened to questions by members of the Association to be submitted to manufacturers for answers as to production and availability under priorities.

Second Session—Jobbers

At the Tuesday afternoon session, Sterling F. Smith, chief, Refrigeration and Air Conditioning Section, WPB, gave a short extemporaneous talk on WPB orders affecting refrigeration supply jobbers, and then answered questions from the audience.

J. W. Krall, of the Detroit Lubricator Co., talked about the Controlled Materials Plan and how it affects the refrigeration jobber. Mr. Krall said the Controlled Materials Plan is primarily a manufacturer's problem. It was devised to enable the War Production Board to determine how much product can be made out of the materials that are available. He emphasized the fact that in making application for priority it must be accompanied by all information requested.

Following Mr. Krall's talk, the meeting was opened for questions, most of which were answered by Mr. Smith. These questions and answers along with those at other sessions, are compiled and summarized on another page of this issue.

Concluding this session, an executive meeting of the jobbers was held, at which officers were elected for the coming year as follows:

President, Harry Alter, The Harry Alter Co., Chicago, Ill.

Vice-president, H. W. Small, The Thermal Co., St. Paul, Minn.

Secretary-treasurer, H. W. Blythe, H. W. Blythe Co., Chicago, Ill.

Joint Meeting

THE final session and joint meeting of the three Associations was held Wednesday morning, under the direction of Alex H. Holcombe, Jr., president of the Jobbers. At this meeting reports from the product group meetings of the Refrigeration Equipment Manufacturers Association were presented.

Ed Graff, Ranco, Inc., reporting on temperature controls, said deliveries of this equipment would average from two to four weeks. Manufacturers request that all repairable controls be returned.

Herman Spoehrer, Spoehrer-Lange Co., St. Louis, reporting on float control valves, said the time of delivery would vary with sizes, styles, etc., and may run as long as three to four months, the average probably being about four to six weeks. They are still interested, he said, in salvaging scrap.

Robt. White of the Day & Night Manufacturing Co., Monrovia, Calif., emphasized that all members become familiar with WPB orders and fill in all information required.

Kenneth Newcum, Superior Valve and Fittings, Pittsburgh, Pa., reporting on valves, fittings and accessories, explained that some items listed in manufacturers' catalogs are not available because of limitations set up in Order L-38. Manufacture of all hydrators, he said, would be continued and in a general way he thought this situation should be much better in 1944. They are going to find it easier, he said, to get materials under the Controlled Materials Plan which has gone a long way toward eliminating uncertainties. He also asked that specific information be given, including correct catalog numbers and description, and also suggested that orders be combined in order to save time.

L. W. Horr, Acme Industries, Jackson, Mich., reporting on heat transfer equipment, answering a question as to obtaining coils under P-126 rating, said that all coils using steel tubing require an AA-1 rating for replacing. Deliveries of fin coils, he said,

would require about four weeks; fin condensers and blower coils, four to ten weeks; plate coils, six to eight weeks. Ability to supply material on lower rating than AA-1 depends upon the manufacturer's position with respect to inventory and other orders. This group also expressed hearty approval of the organization of a committee to give consideration to post-war planning.

Following a conference with other manufacturers, Mr. Spoehrer reported later that the present interpretation is that a rating of AA-4 or higher is required for repair of expansion valves. Although admitting that there was some confusion on this point, he suggested that this stand until a later ruling.

Paul B. Reed, service manager, Electric Refrigeration and Air Conditioning of Servel, Inc., and chairman of the War Educational Committee, R.S.E.S., read an important message on the coming crisis in refrigeration service. This paper is published in full in this issue.

Following the presentation of Mr. Reed's important paper, an informal meeting of the Refrigeration Service Engineers Society was called by President Plesskott. At this meeting the program of the Society's activities during the next few months was discussed informally.

The Refrigeration Picture

ONE of the important features of the meeting was a paper presented by Sterling F. Smith, chief, Refrigeration and Air Conditioning Section, WPB, giving a general picture of the Refrigeration and Air Conditioning Section and its operation. This paper was presented following the joint luncheon Wednesday.

Illustrating the vital importance of refrigerating machinery to the prosecution of the war, he stated that out of 84 industries considered vital to the war, 28 of them could not be operated at their full capacity, and in some instances could not function at all, without refrigerating machinery. He then described some of the industrial processes in which refrigeration plays a major part, including airplanes and engines, synthetic rubber, high octane gasoline.

Speaking of the confusion in Washington, the numerous shifts and reorganizations, and the original antagonistic attitude of business interests toward regulation, he said the important thing is that now industry and government are pulling together and winning the war. The organization in Washington

The Cameraman Snaps Celebrities and Others at the Refrigeration Wartime Conference Held at the Palmer House, Chicago, April 13 and 14



has changed and industry men more and more are taking an active part.

The industry operating sections of the War Production Board, he said, are now organizations of business men dealing with business men. He then told how the section of the War Production Board representing the industry is set up and in general how it functions. Every man who has anything to do with passing on priority applications of any kind is an industry man with at least 10 years experience, thus they can understand the industry's problems.

Delay Is Explained

Turning to the Government order covering the operation of the industry, he said the seemingly endless delay which takes place between the time orders are discussed with the Industry Advisory Committee and their issuance is caused by the fact that all people who might possibly be affected by the order must have a chance to make known their wishes with regard to the terms of the order. The fact that 22 industries are vitally affected by refrigeration and air conditioning gives some inkling, therefore, as to the problems involved in clearing an order, since all of these industries must have their say in court on any order which affects their operation. And in addition, there are other industries which may be affected incidentally. Orders affecting the refrigerating industry, he said, are M-28, the order on Freon refrigerant; L-126, the conservation and simplification order; P-126, the emergency service order; and L-38, the general limitations order.

On Order M-28, he said, there is no shortage of Freon at present, but there is a continual shortage of cylinders. He urged that special effort be made to return these cylinders promptly.

Order P-126, covering materials for emergency servicing for industrial and commercial refrigeration and air conditioning systems is a very important order, he said, affecting not only the refrigeration business, but every individual citizen who is more than a few hours removed from a source of fresh food. This order, he said, is not one designed to enable refrigeration men to do business as usual, but is an emergency service order to make emergency repairs possible.

Order L-38, as amended April 6, sets up various provisions covering deliveries and production. It also has an important effect

upon the entire refrigerating and air conditioning industry, including dealers and distributors. Under this order the delivery of any new parts, regardless of how they were acquired for inventory other than for emergency repair service, can be made only on an authorized order or to the armed forces. Application on the new forms, PD-880 or PD-881, for the authorization to purchase equipment will be considered only if the equipment is to be used for an essential use as described on List C of the order.

He was giving, he said, only an outline of these four orders governing the various phases of the refrigerating industry. He advised that they should all be read carefully because they have an important bearing upon obtaining all essential materials. The effect of these orders, he said, has been to make certain essential items available and incidentally to wash unessential items out of the picture.

Regarding the manpower problem, he said, 1943 will see a need for 6,400,000 men, workers and fighters. In the past the men absorbed by war industry and the military came from the unemployed and farm. These have been depleted and now many essential civilian industries must give up men at a very fast rate and at the same time women will be drawn into more and more jobs in war industries.

The estimate is that 3,200,000 workers must be given up by construction, finance and service industries during 1943. All this, he said, is going to force industry and many individual families into a very painful readjustment. This will have an effect upon WPB at present through a movement to standardize things in many lines which has been partially accomplished in the refrigeration industry through Order L-126. In 1942, only 85 standardization and simplification orders were issued by the War Production Board, of which L-126 was one of the first. In 1943, more than twice as many such orders are contemplated. "Your best bet all the way down the line," he said, "is to keep in touch with your Industry Advisory Committee and your trade association."

Industry Advisory Committee

The general Refrigeration and Air Conditioning Industry Advisory Committee, he stated, is made up of the following men: Donald F. French, Carrier Corp.; M. G. Munce, York Ice Machinery Corp.; J. B. Rainbault, Gen-

(Continued on page 42)

Some Answers to Priority Problems

AS EXPECTED, the Wartime Conference of the refrigeration industry was featured in the meetings and in the corridors by serious discussions of WPB Orders and priorities problems. Concrete answers to some problems remain for solution in the future but information important and useful to service engineers resulted from the discussions.

Secure PD-399 from Washington

All agencies regularly engaged in repair service to refrigeration systems classified under P-126 should apply at once for certification as an Emergency Service Agency if they have not been so certified. Request a copy of Form PD-399 from:

War Production Board
General Industrial Equipment Division
Washington, D. C.
Reference: P-126

According to Sterling Smith, Chief of the Refrigeration Section, they will not process PD-399 applications unless the form was obtained direct from the Section in Washington but they are eager to have all bona fide agencies properly certified and operating under the order. The greater the number of certified Emergency Service Agencies the greater will be the force which the refrigeration industry can exert to secure adequate materials and protect the manpower needed to accomplish its vital tasks.

Temporary Delivery or Loans

Questions brought out the fact that many are not familiar with the loan or temporary delivery provisions of Order L-88. Under section (g) *Exemptions* paragraph (1)(ii) (a) the order permits, "The temporary delivery of a used system or parts to a dealer or producer for repair and redelivery to the same owner, the redelivery of a repaired system or part to the same owner, or the loan of a new or used system or parts for a period not to exceed 90 days pending the performance of 'emergency repair service' to a used system or parts."

It was emphasized that the exemption gives the service agency an opportunity, if it has the parts or equipment available, to install them on the customer's premises to

keep refrigeration service going while repairs are being made. In the case of temporary installation of a whole system it was emphasized as necessary under the order to replace the customer's unit in his establishment when it is repaired.

In the case of a dryer, however, or such other part it was expressly stated that the service agency need not go back and reinstall the dryer brought in for repairs. The service agency could repair the dryer and put it in stock and save the time and mileage otherwise required to return it to service in the customer's establishment.

The example of the dryer falls reasonably under section (c) of the order which provides that defective parts made of metal must be salvaged, repaired if possible, and placed in stock. The replacement of several required parts on the system would logically come under the same provision. In other words the service agency in the case of parts would have an option of temporary delivery or of replacement and salvage, but could not consider anything except temporary replacement of the system as a whole under the temporary delivery provision.

Minimum Ratings

It was stated that dealers certified as Emergency Service Agencies may not buy any parts controlled by Order L-88 without an AA-4 or higher rating. Such agencies, however, have an AA-4 rating for maintaining inventory and higher ratings applying to certain classes of "emergency repair service."

No answer was given to a question on repair of parts for domestic refrigerators which are not covered by L-88 or P-126. The manufacturers were not clear as to the priority they would require. The jobbers at the war conference were unanimous in denying that they request any preference rating on domestic parts or supplies purchased from them by dealers.

Separate Departments Indicated

It is apparent that a service organization which is certified as an emergency service

(Continued on page 42)

COMMERCIAL

INCREASE BUSINESS BY
DOING A MORE EFFEC-
TIVE JOB OF SELLING

Selling

Rigid Tool Protection Plan Insures Against Loss of Time and Income for Service Firm

By Robert A. Latimer

WITH the business of every refrigeration service firm at an all time peak under war conditions and a shortage of materials to contend with at the same time, nothing is more important to economy and getting the job done than careful conservation of tools. That's the way "Jack" Daniels, head of City Refrigeration Service Company, St. Louis, Mo., explains a tool-protection plan adopted several months ago so successfully that many other Missouri shops are taking it up.

City Refrigeration Service, handling a vast amount of domestic refrigeration repair work as well as maintenance contracts on freezers in retail stores, dairy refrigeration, air conditioning and general commercial types, has just completed a sweeping economy plan which has two main objectives: First, saving every possible moment of time for use on the routes; and second eliminating waste costs which are a steady drag on profit. Everything from eighteen service mechanics' cars to the chemicals used for cleaning up the McPherson Avenue building occupied came under consideration. "We have found it possible to save hundreds of dollars per month in

small profit leaks," Mr. Daniels said. "But actually we are not so much interested in saving money as we are in saving time, and we've traced the greatest time loss to first the customer forgetting to have everything ready for us, and second, forgetting or misuse of our valuable tools."

Customer Cooperation

City has done everything possible to make certain that the customer cooperates. Not much can be done about that, but Mr. Daniels could and did "do something" about tool conservation. "I called the staff together a few months ago for a talk on the matter," he said, "asking each man whether he had been delayed by a lost or broken tool recently. Nine of them had, and were ready with suggestions to evade this in the future.

"What we have done is put a stop to careless handling of tools by insisting that every man's kit undergo a daily inspection, that all shop tools be checked out and returned by their users, and that the man in charge inspect each tool at least once a week for signs of oncoming dam-

A.W.O.L.



May, 1943

32

THE REFRIGERATION

SEND HIM BACK immediately to his post (Carney's Point, N. J.). You'll recognize him instantly—he's the empty "Freon" cylinder in your shop.

He's needed for war duty—to carry "Freon" to war production plants, to military bases, and to you in your job of servicing vital civilian needs.

When you return him, be sure to include that brass cap that belongs on the valve. We can't get new caps for love or money—and a cylinder without one is almost as bad as no cylinder at all.

RETURN CYLINDERS THE INSTANT THEY ARE EMPTY



KINETIC CHEMICALS, INC., MAKERS OF "FREON"™ SAFE REFRIGERANTS

*"Freon" is Kinetic's registered trade mark for its fluorine refrigerants

age. We make each man keep his tools neatly arranged for convenient use and prevention of damage, keep them clean from grease and acids, and immediately replace or repair any which are damaged on the job. It took a little time of course. One thing done to impress the man with the value of his tools was to let him go on calls a few days without whatever tool had been lost or broken, and after grumbling about it, he is sure to be more attentive of their condition thereafter."

In City's large St. Louis shops (largest in the middle west from an all-around standpoint) many shortcuts in repair work have been developed, necessitating use of power tools and some novel types designed by the management themselves. All are kept in perfect condition to prevent possible later shortages through a 10-point maintenance program as follows:

Maintenance Program

1. Cleanliness of every tool. Even simple wrenches and hammers in City's shops must be wiped clean and shiny after every using, and returned to the tool room at the close of the day as spotless as when checked out. No acids, dirt, rust or grease can accumulate under this system. Psychology counts heavily in this connection, Mr. Daniels emphasizes, for men will take better care of clean, new-appearing tools than they will with dirty ones.

2. Close tool check every week. All City Refrigeration Service Company tools, whether they are seeing service in mechanics' cars, or in the shop, are minutely scrutinized for damage or future breaks. This includes examination of threaded parts under a strong light, checking of pressure instruments and more delicate tools in the shop, and welding repairs where cracks or chips have been developed on heavy-duty equipment. A record is kept of the inspection of each tool and turned into the office at the end of each week. Such minor things as cracks in wrenches or chipped file surfaces can be repaired and save a certain loss later on.

3. Educating of men to understand their tools. Many mechanics unknowingly

put a strain on refrigeration service repair equipment because they do not understand tool construction. Therefore, City has a periodic "class" for this purpose, in which instruments, tools, gauges, etc., are taken down and the correct use of each explained at length.

4. Regular inspection and cleaning of power-operated tools. Men who keep compressor motors spotless and gleaming are often prone to leave electric motors on lathes, saws, etc., dirty in their own shops, Mr. Daniels has found. Therefore, all power equipment in the shop is inspected regularly, motors cleaned inside and out, and air pressure used to force out dust, lint and other accumulations which will later rob the machine of power and possibly burn out its motor.

5. Changing of grease and lubricants in power equipment. No matter how well a machine is functioning, City insists that its gears, rods, cams, etc., be cleaned each weekend thoroughly, flushed of old grease, and the proper lubricant replaced anew. Few machines run more than 50 to 100 hours without this kind of attention—and minor breakdowns and new parts are a thing of the past.

6. Complete testing and checking of electrical leads, fuses, switches, etc., each month. Possible short circuits and damage have been uncovered frequently with this method, done by an electrical expert on the staff.

7. Insistence on best use of tools. Mr. Daniels has laid penalties on misuse or abuse of tools, a frequent cause of trouble. "Wrenches clamped on a balky tube while the mechanic hammers on the handle are likely to break off when a slightly larger wrench would do the job," he pointed out. "Our men have been shown how to use every tool properly, and if a broken one indicates carelessness or abuse, the cost of the new tool is charged to him."

8. Expert tool repairs. With complete metalworking facilities, City has been able to recondition and put back in service many tools which otherwise would become so much scrap. All repairs are made by

(Continued on page 50)

THE STANDARD OF *Enduring Craftsmanship*

Young Revere in his father's work shop — 1752



Paul Revere, silversmith, political leader, power mill designer, Revolutionary Lt. Colonel of Artillery in his early thirties, combined his great sense of craftsmanship with practical vision. In founding the great metal company bearing his name, Revere spanned in his lifetime, the often gradual transition from individual craftsmanship to great industrial development.

A great part of the value you get in Virginia products today is the fine craftsmanship exercised in every department of manufacture.



EXTRA DRY ESOTOO, V-METH-L AND METHYLENE CHLORIDE



"VIRGINIA" REFRIGERANTS
AGENTS FOR KINETIC'S "FREON-12"
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QUESTIONS AND ANSWERS

On Interpretations and Rulings on Government Orders Covering
Refrigeration Sales and Service Bulletins

BECAUSE of the interest in Government war regulations pertaining to the refrigeration service business, THE REFRIGERATION SERVICE ENGINEER answers below a number of individual questions on the application and interpretation of the above regulations. The answers to these questions have been checked carefully for accuracy. However, since government regulations are subject to constant changes and modifications, we cannot guarantee the correctness of answers beyond the date of the issue in which they appear. Readers are invited to submit questions pertaining to their individual problems.

CORRECTION

Under Revised Order P-126, material for emergency repairs on beverage and beer cooling equipment may be obtained under an AA-4 rating. This is provided for in Paragraph III, Class III of that Order. This statement is made to correct the statement made in answer to Questions 12 and 17 in the April issue regarding the coverage of beer cooling equipment under P-126.

EMERGENCY PRICES

QUESTION 18: I set a price on a refrigerator and sold it to a customer one night, but I couldn't call the OPA office at the time because it wasn't open. I did call them for an O.K. first thing next morning, before delivering the box. Was that all right?—R.H.P.

ANSWER: Any sale or offer to sell, regardless of delivery date, is a violation if you charge more than the OPA listed figure. Ignorance or good intention is no excuse. The OPA has its figures posted; it's up to you to know what they are. Prices on household refrigerators are established in Maximum Price Regulation 139 of the OPA.

HOURLY RATES NOT SHOWN

QUESTION 19: What happens if your books don't show your hourly rates for March, 1942?—R.H.P.

ANSWER: Your books will show them if you break the figures down. For instance, the cost of materials, and of transportation to and from the job, if that comes in, subtracted from the total jobbing figure, divided finally by the number of hours spent on the job, represents your hourly service rate. If

you didn't vary your charge whether the call was near or far away, then you can't figure transportation costs in your present quotations. The figures must all be there, even though you may face a problem in trying to break them down. In that case call in an OPA inspector. That's part of his job.

PART TIME SERVICE WORK

QUESTION 20: I would like to know if a person who becomes employed under Civil Service and changes address can continue to take care of service pledges contracted before becoming so employed. Is it permissible to do other minor repair jobs outside regular working hours?—D.K.

ANSWER: If your question has to do with your status under Civil Service, I believe you should check this matter carefully because in certain cases, at least, they do not permit an employee to engage in outside work. Apart from this, our opinion would be as follows:

If you have applied for and received an emergency service certificate, it is our opinion that this status was not changed when you accepted a Civil Service appointment and that you could continue your refrigeration service on a part time basis.

There is nothing in the regulations, so far as we know, that would prohibit your doing minor repair jobs outside regular working hours, providing you have a certificate as an emergency service agency. Purchase of materials and parts for such jobs, however, are regulated by the provisions of Order P-126.



The Changing World

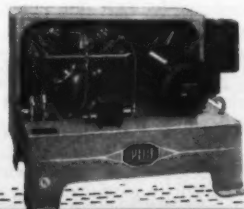
★ ★ ★ Housewives riveting . . . office workers running intricate machines . . . men from every walk of life studying mechanics in the services. Yes, this is a changing world.

★ ★ ★ These are the people who will make up tomorrow's market . . . a market keenly aware of mechanical perfection . . . a market with the ability to choose outstanding products.

★ ★ ★ PAR Condensing Units will appeal to this mechanically minded America of the future. For the experience gained in our war assignments will be added to our well-known ability and facilities in producing condensing units that are outstanding in their fields.

Manufacturers of
PAR Commercial Refrigeration Equipment

PAR
DIVISION



LYNCH MANUFACTURING CORPORATION - DEFIANCE, OHIO U. S. A.

OBTAINING COPPER PIPE

QUESTION 21: How can I obtain about 120 ft. of copper 1/2-in. pipe, also 30 ft. of copper 1/4-in. pipe, for dairy farmers use?—C.W.F.

ANSWER: If you are an emergency service agency, certified under WPB Order P-126, you can employ the ratings extended under this order for emergency repair service in the various classifications stated in the order.

The furnishing of emergency repair service to farm milk coolers and the maintenance of allowable inventory by an emergency service agency are both extended a priority rating as high as AA-4 under Class III of Order P-126. If you are not certified under this Order, we would suggest that you apply as directed in the order. Until you are certified, the farmer will have to file a PD-1A application to secure the material.

CEILING PRICES—INCREASING INVENTORY

QUESTION 22: There are two second-hand furniture stores here which buy and sell used refrigerators, selling them for more than the ceiling price. Does this ceiling price apply to them as well as to refrigerator dealers? During normal times I did not carry a very large reserve stock because I could get supplies from the jobber in about six hours, but now it takes sometimes a month or more. Can I carry a larger reserve emergency stock of refrigerator repairs under this new ruling?—J.R.D.

ANSWER: The ceiling prices on used refrigerators apply alike to all sellers. If any stores in your city are selling used refrigerators for more than the ceiling price, they are violating the OPA regulations.

Under Revised Order P-126, you cannot increase your inventory of supplies and parts in excess of such inventory held on December 31, 1941. However, there is a provision that any agency which considers that its compliance with this restriction would prevent the rendering of necessary emergency repair service may apply for specific authorization to permit it to apply preference ratings under the Order to obtain the parts for inventory. We suggest that you file an appeal addressed to the War Production Board, General Industrial Equipment Division, Washington, D. C. Ref. P-126. State your case fully in a letter in triplicate addressed as above.

RETURNING USED PARTS

QUESTION 23: In regard to revised P-126 order, is it mandatory to return the used part to the jobber if he demands it, even though it is possible and desirable to recondition and hold in my inventory as an emergency repair part?

What I have in mind is a compressor body. However, I am of the opinion that all parts are to be handled on the same basis and as I understand the order, the emergency service agency has the option of either repairing the old part or return it to his supplier or scrap it with an established junk dealer if beyond repair.—G.L.

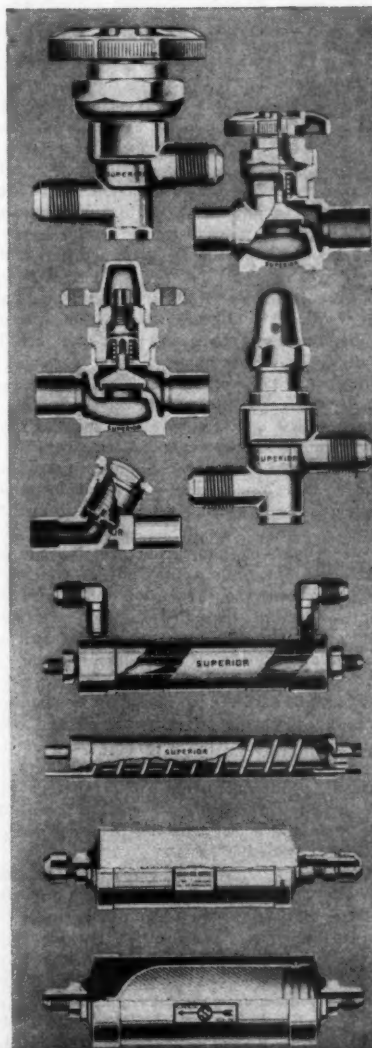
ANSWER: Your understanding is correct. Revised Order P-126 (paragraph d-3) provides such old parts obtained from a customer shall be repaired and placed in the service agency's inventory, returned to the supplier of the new part, or disposed of to a scrap dealer. An exception to this is block tin which must be returned to a fabricator of such pipe.

With regard to the supplier demanding return of the used part, that would seem to us entirely outside provisions of this Order. He may establish that as his own trade custom, which he would have a right to try to do, but there are certain conditions which could prevent his making it mandatory. He cannot use this to circumvent Priorities Regulation No. 1 and disregard priority ratings on orders. OPA regulations in connection with prices would prevent addition of any sales terms which did not apply during the base period.

REPLACING CONDENSING UNIT

QUESTION 24: We would like to know if we can replace a condensing unit on food storage cases when it is in retail market and if the cost is excessive on repairs that are not practical?—R.L.M.

ANSWER: In Order L-38, paragraph (a) (8) provides "Emergency repair service" means the repair of any installed system when, subsequent to its installation and operation, a breakdown occurs therein, or is immediately threatened. The term shall not include replacement of the high (pressure) side or condensing unit (with or without motor or condenser) except in sealed unit types, the low (pressure) side, or the insulated enclosure, or any change of the type of refrigerant, design, or capacity of the system; but shall include necessary replacement of any component part of the high side,



Superior PRODUCTS *for Your Essential* WARTIME NEEDS

- ★ **DIAPHRAGM PACKLESS VALVES** — Two-way and globe — $\frac{1}{4}$ " to $\frac{5}{8}$ " flare; $\frac{1}{4}$ " to $\frac{1}{8}$ " sweat; $\frac{1}{2}$ " and $\frac{3}{4}$ " F.P.T.
- ★ **PRESSURE CUP GLOBE VALVES** — $\frac{1}{8}$ " to $2\frac{1}{8}$ " sweat; $\frac{3}{4}$ " to 2" F.P.T.
- ★ **PACKED VALVES, BACK-SEATING** — Hex. seal cap. Flare and sweat to $\frac{5}{8}$ "
- ★ **CHECK VALVES** — Positive; noiseless. $\frac{3}{8}$ " to $\frac{5}{8}$ " flare; $\frac{3}{8}$ " to $\frac{1}{8}$ " sweat.
- ★ **LIQUID INDICATORS** — With seal cap. $\frac{1}{4}$ " to $\frac{3}{8}$ " flare; $\frac{1}{2}$ " to $1\frac{3}{8}$ " sweat.
- ★ **DEHYDRATORS** — Refillable; 6 to 60 cubic inches.
- ★ **FILTERS** — 1 to 5 HP.; $\frac{1}{4}$ " to $\frac{5}{8}$ " flare.
- ★ **HEAT EXCHANGERS** — 4200 to 36,000 BTU capacity.

See your Jobber, or write for copy of
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low side, or insulated enclosure, if such part cannot be repaired and if the part installed is not of greater capacity than the part replaced, and shall also include the shop repair of the replaced component part."

Under present conditions there are few cases where it would be necessary to replace the whole condensing unit. Complete destruction by fire is one of such cases and in that event it would be necessary to secure authorization from WPB on Form PD-881.

HUDSON BOMBER PARTS HELD IN COLD ROOM

GREAT savings in time in the handling of vital airframe parts for bombers have been effected by the recent installation of a big refrigeration room in the aircraft division of the Hudson Motor Car Company, Detroit. A photograph of the room is shown on the front cover of this issue.

These aluminum alloy parts must be maintained within a range of very low temperatures following heat treatment. They are then in what metallurgists term a "soft" condition, required while they are being worked into bomber fuselage sections and wings.

If not so protected, the parts again become too hard to be worked and require another 16 to 24 hours to go through the process of re-heat treating. The savings in time and material through protection afforded by the refrigerator room thus are manifest. Additional savings in time stem from the fact that use of the room makes practical the running of much larger quantities of parts at one time through heat treating.

The refrigerator room, all cork insulated, is in fact a big box, 18 feet long by 14 feet wide and 10 feet high, with walls 11 inches thick. It is strategically "spotted" in the center of the factory, between the bomber fuselage section and the Curtiss-Wright "Helldiver" bomber wing jobs, supplanting the many smaller boxes formerly used in individual departments.

Temperature in the room is held to an average of about 20° below zero. Here the parts are placed on shelves after being brought from the heat treating department. Workmen are able to take the parts out one at a time as needed, without entering the room, by use of small shoulder high doors on the side. Each door bears a list of the parts within reach, so the box need be opened no longer than is necessary for quick selection. A large door at the end permits entry with big parts.

THE COMING CRISIS IN REFRIGERATION SERVICE

(Continued from page 24)

The survey indicates a serious situation that is already upon us but which will become worse during the coming hot months. It is as idle to say that years ago we did without mechanical refrigeration and that we can do so now as it would be to expect workers in war plants to walk or ride horseback to and from their jobs as workers did years ago. Present day society is geared to a different manner of life from pioneer days or even the gay nineties. Production, processing, transportation, wholesale and retail handling and even home storage of perishable food, many of which, such as meats, fish, milk, eggs and many vegetables and fruits, which are staple in our diets, absolutely depend on mechanical refrigeration. Production of planes, tanks, guns, and other modern war implements is dependent upon modern processes using mechanical refrigeration.

We would like to disbelieve the stark truth revealed by the survey but we are compelled to face the realization that there is scant hope but that this summer will see thousands of tons of badly needed foods lost by spoilage, thousands of hours of essential workers lost because of sickness due to eating tainted food and an increased burden on already overburdened doctors, nurses and hospital facilities, not to mention the damage to public morale; and all because of the lack of a comparatively small number of refrigeration service engineers to keep in operation the equipment for preserving the nation's perishable food.

The ones that are left can't even do the job—they must have help from their former buddies and to further thin their ranks is pure folly. The Refrigeration Service Engineer's Society believes that the situation is of sufficient gravity as to merit consideration and early action by the very highest officials in the land, those who establish policies to be handed down to and followed by others who effectuate the policies and many of whom realize, just as we in the industry realize, that the matter demands immediate action but who are powerless to act contrary to established policies and routines. These are plain words but the urgency demands plain speaking and prompt action if we are to avert this coming crisis in refrigeration service.

Nothing else fills the bill like the "RECALIBRATOR"

NOW that gauges and dial thermometers face harder and longer service, and heavier responsibilities, you have more reason than ever before to look for that "Recalibrator" screw.

It's the sign of an instrument that is accurate to begin with, and can be kept accurate always.

No one has ever found a way to build a gauge that can't be knocked out of adjustment, but . . .

—Marsh has found the one completely satisfactory way to do something about it. When a "Recalibrator" gauge is knocked out of adjustment, the twist of a screwdriver corrects it—actually recalibrates the gauge so it is accurate again at every point on the dial.

JAS. P. MARSH CORPORATION
2059 Southport Avenue, Chicago, Illinois



• The "Recalibrator" is available on all Marsh Gauges—standard on all Marsh Dial Thermometers. It is typical of the advanced design, the helpful features you'll find throughout the broad Marsh line—all products of 75 years of specialization. Write for refrigeration catalog.

MARSH

Refrigeration Instruments

NEWS ON GOVERNMENT ORDERS

(Continued from page 13)

An application sent to Washington instead of to district offices will be returned to the field office where it must go through the channels set up under the new regulation.

Eitel said that the Chicago regional WPB priority division is now processing more priority ratings each month for the states of Illinois, Indiana, Iowa and Wisconsin, than was processed monthly for the entire nation in 1918 during the first world war.

§ § §

SERVICE PRICE REGULATION AMENDED

THE adjustment provisions of the price regulation on service (MPR-165) have been amended recently.

When there is an actual or threatened shortage of essential services in an area either the Price Administrator or the regional administrator for the area may establish maximum prices for them. The detailed situations under which these adjustments of prices for service may be made are shown in Section 1499.114 sub-section (d) of the Regulation.

A further amendment bans application for adjustment based upon special circumstances filed by applicants whose grounds for relief do not conform to any of the specific adjustment provisions of the regulation. These were previously permitted under Paragraph (c) of the above section.

§ § §

REFRIGERATION CONCERN PENALIZED

THE Refrigeration Engineering Co. of Minneapolis, Minn., with offices in the Foshay Tower in that city, has been penalized by the War Production Board for unauthorized sale of refrigeration equipment, regional WPB officials announced in Minneapolis, April 2. F. H. Kaup, operator of the company, according to the record, sold equipment on purchase orders which were not rated or classed as preferred orders to persons not entitled to receive such supplies under terms of a WPB limitation order. He will not be permitted to handle any refrigeration or air conditioning equipment for the next three months, under the suspension, without written authorization from WPB regional office in Chicago.

DEALERS MUST POST PRICES

COMPLAINTS have been received that some dealers in new electric refrigerators are charging more than the Office of Price Administration ceiling prices, according to Michael F. Mulcahy, director of the Chicago metropolitan office of the OPA. He warned that dealers must post the make, model number and ceiling price for each refrigerator offered for sale.

§ § §

REFRIGERATION INDUSTRIES HOLD WARTIME CONFERENCE

(Continued from page 29)

eral Electric; F. M. McNeill, Universal Cooler Corp.; R. O. White, Day and Nite Water Cooler Co.; A. B. Schellenberg, Alco Valve; Wayne Jordan, Liquid Carbonic; E. R. Walker, Fedders Mfg. Co.; C. V. Hill, Jr., C. V. Hill Co.; H. Newcomb, Servel, Inc.

This Committee, he said, is the board of directors of the industry. A meeting is scheduled for it each month in Washington, at which various problems of the industry are discussed, recommendations are made, and the WPB follows through on these recommendations.

§ § §

ANSWERS TO PRIORITY PROBLEMS

(Continued from page 30)

agency and also renders domestic service should operate in two departments as far as its inventory, its tools and its applications of priorities are concerned. For instance the tools employed in emergency service may when worn out or lost be replaced by applying the rating extended by P-126 to the jobs on which the tools are used.

In the case of domestic refrigerator service, however, such tools may be secured on an AA-2x rating under CMP Reg. 5. It should be remembered, however, that this regulation applies to the tools used in the service agency's work and not to parts applied to the customers' refrigerators.

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Edgar A. Poole,
New Brighton, Penn.

"Keep up the good work. R.S.E. still leads the field."

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Be Ready For The Spring Rush



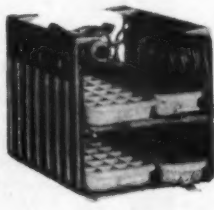
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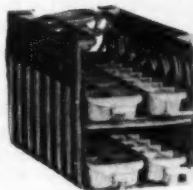
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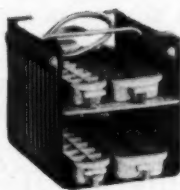
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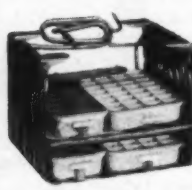
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30498



27375

IMMEDIATE SHIPMENT WHILE STOCKS LAST

No priority needed. Trade discount 50%. Special prices to Jobbers.

SPECIFICATIONS AND LIST PRICES

Quan.	Part No.	SIZE			MTG. DIMS.		No. Trays	List Price
		D	H	W	Front	F to B		
20	27375	12	9	12	7 $\frac{1}{2}$ "	8 $\frac{1}{2}$ "	4	\$53.00
34	28351	12	10	9	7 $\frac{1}{2}$ "	8 $\frac{1}{2}$ "	4	42.50
2	28352	12	10	9 $\frac{1}{2}$	7 $\frac{1}{2}$ "	8 $\frac{1}{2}$ "	4	52.00
9	28842	12	12	12	7 $\frac{1}{2}$ "	8 $\frac{1}{2}$ "	4	55.00
82	29232	12	10	9	6 $\frac{1}{2}$ "	8 $\frac{1}{2}$ "	4	50.00
26	29233	12	10	9 $\frac{1}{2}$	7 $\frac{1}{2}$ "	8 $\frac{1}{2}$ "	4	53.00
542	29471	12	10	8	6 $\frac{1}{2}$ "	8 $\frac{1}{2}$ "	3	51.00
294	29849	12	10	9	6 $\frac{1}{2}$ "	8 $\frac{1}{2}$ "	4	53.00
156	30498	12	10	9 $\frac{1}{2}$	7 $\frac{1}{2}$ "	8 $\frac{1}{2}$ "	4	36.25

NOTE: No. 30498 is stainless steel, designed for high side float but adaptable for expansion valves. All other evaporators are copper construction for use with, and prices include, a No. 672 Detroit Lubricator expansion valve.

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AIR CONDITIONING AND REFRIGERATION SUPPLIES

900 W. BALTIMORE AVE.

DETROIT, MICH.

PHONE: MADISON 1075

The Question Box

Readers are invited to send their problems pertaining to the servicing of household refrigerators and small commercial refrigerating equipment to "The Question Box."

ADDITIONAL COMMENTS ON QUESTIONS 534 AND 535

IN REGARD to Question 534 on brine tank leaks, I wish to advise that a liquid solder of the Warner brand has been used with much success in calcium chloride brine. I have used it several times and it holds every time. I had a liquid carbonic fountain which leaked at the middle plate, the brine going down to about half full. And you know it is a big job to pull a fountain tank and solder it. So I tried the Warner liquid solder and it worked and after four years or so it still holds. Have used it in other fountains, too, with success. Two cans of it were used in one fountain. When adding the liquid solder to the brine some of the brine should be drawn out and mixed in by stirring and then adding the brine mixture back to the fountain, etc.

As to Question No. 535 in regard to a noisy Grunow, these buffer springs have nothing to do with the holding of the blades to the surface. They only silence the blades if they should bounce back. Centrifugal force is what holds them out. The fact that springs are removed does not in any way cut the efficiency of the compressor. I most generally remove them when I have to take it apart to remove a broken spring.—I. J. S.

MODEL "C" GRUNOW SEAL LEAKS

QUESTION 546: Your July 1933 issue of *THE REFRIGERATION SERVICE ENGINEER* does not give all the information I would like to know on the Type C Grunow. The unit that I have at hand which has developed a leak on the evaporator built up a pressure and caused the seal to leak oil. Will it be necessary to install a new seal?

Upon inspection of the condenser and float and small dryer which is the original at the factory, I find that there is quite a bit of water, I suppose, in this dryer. As there is no way that I can find to clean and refill this dryer, will it be necessary to install a new one, and if so, what drying agent shall I use? Will it be necessary to dissemble the compressor and wash it, and clean it as

usual? The efficiency tests about 28" of vac., so I am considering changing the oil and baking, as I believe that is all this part will need.

ANSWER: I don't think that it will be necessary to replace the seal on the Type C Grunow refrigerator, but it may be necessary to clean it or even lap it. The fact that it is leaking oil does not always indicate it will leak refrigerant, but on the other hand, it may indicate that some foreign matter has become lodged between the two sealing surfaces, and if it is not removed, the oil will continue to leak until refrigerant will also leak through at that point.

Yes, I think it would be better to replace the dryer rather than attempting to refill it, because if there is quite a bit of water in this system, it is probable that the metering device is becoming partially clogged with foreign substance gathered in the system.

The drying agents usually used in these devices are Silica-Gel or Drierite. It is difficult to say whether it will become necessary to clean the compressor, but if its efficiency is being maintained, it would seem that this work could be eliminated. The usual effect of moisture in Grunow compressors is to cause a copper coating on the machine parts and this copper coating will usually build up on the blades and on the cylinder walls until the efficiency of the compressor is impaired. If the efficiency so far is not affected, however, and the system is thoroughly dried out at this time, it may not be necessary to do anything further to the compressor.

MAJESTIC MODEL 103

QUESTION 547: I have a rather old Majestic sealed unit—Model 103. The unit has just been rebuilt by a hermetic rebuilding plant. It cools and freezes all right, but the off period is so long, it defrosts itself every cycle. It will run about 7 or 8 minutes—then it will be off for about 30 minutes. Where is the differential control on this model? I have the January, February and March issues of *THE REFRIGERATION SERVICE ENGINEER*, but could not find the information there.



HOW'S YOUR JOB-MILEAGE?

If you have to go back once to finish a service job, your mileage for that job is doubled; if twice, it's tripled, and so forth. Call-backs are tough on gasoline rations and tires . . . very important items these days. And how about the value of your time, when skilled refrigeration service engineers are scarce and overworked?



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195 VERONA AVENUE, NEWARK, N. J.

JUST OFF THE PRESS!

If you are interested in boosting your income and holding down your expenses, ask your jobber for our new "Less-More" pamphlet. There's a simple tip in it for you under the heading "Dollars and Sense."

THAWZONE

Fully Endorsed by U. S. Patents

The PIONEER FLUID DEHYDRANT

How can I keep moisture from freezing in the outer bellows chamber of an automatic expansion valve? I put on a new rubber seal cap, but it did not stop it.

ANSWER: Apparently from the description you have given of the trouble of the Majestic sealed unit, the setting on the cold control is either too warm, or the differential is too great. Either adjustment is made within the control itself, providing the control is in good condition and can be adjusted.

There have been a number of different types of controls used on these units, and it is difficult to say just how the adjustment is made on the one you have without knowing its make and type. However, the adjustment should be no different from that of a similar make and type used on any other unit.

With regard to moisture freezing in the outer bellows chamber of expansion valves, the first essential is to have the cap thoroughly sealed so that no moisture can enter, but where moisture has entered and you find it difficult to remove, I would suggest injecting a small amount of glycerine which will combine with the moisture, forming an antifreeze solution.

SUBSTITUTING STEEL FOR COPPER

QUESTION 548: (1) Since copper tubing is unavailable, how much more iron pipe of same approximate size would be required to obtain the same results (percentage) in coiling Zero boxes for farm use? (2) What objection, if any, is there to the use of iron pipe in Freon and Methyl Chloride jobs? (3) How much more efficient for refrigeration is Freon over Methyl Chloride or Ammonia, and why? (4) What insulation is used by manufacturers on Zero ice cream cabinets? Which have walls only 3-4 inches thick?

ANSWER: For all practical purposes, the same amount of iron pipe can be used as would ordinarily be used in copper tubing. There is, of course, a difference in the "K" value of iron and copper, but when we consider that the nearest normal size of iron pipe is always greater than copper tubing the square foot of outside area of iron pipe would be greater than copper tubing. In other words, as an example, if you would ordinarily require 80 ft. of $\frac{1}{2}$ inch copper tubing, 50 ft. of $\frac{1}{2}$ inch iron pipe could also be used. The outside area, however, of the steel pipe will be greater.

There is no objection to the use of iron pipe with Freon or Methyl Chloride from the standpoint of reactions between the two. It must be remembered, however, that iron pipe is never dehydrated and therefore, you may have a moisture problem. Furthermore, there is nearly always scale present in iron pipe which may cause you trouble with either one of these refrigerants. Some iron pipes also contain a dope on the inside of pipe to prevent rust, but which will dissolve in Freon. Freon, as you know, is one of the best solvents, and any scale or compound that may be on the inside of the pipe will be readily dissolved and carried through the system. This can create a great deal of difficulty at the screens in the system. If you plan on using iron pipe with Freon or Methyl Chloride, some effort should be made to make a thorough cleaning job on the inside of the pipe.

Freon is no more efficient than Methyl Chloride or ammonia. There is no difference in efficiency between any of the commonly known refrigerants. It is true that one refrigerant may require a larger compressor than another for a given load. However, the motor size per ton of refrigeration and the current consumed will be almost identical for any of them. A refrigerant which has a high boiling point will usually require the removal of a greater volume of vapor per ton of refrigeration than a refrigerant with a low boiling temperature and for this reason, the cubic foot displacement of the compressor would have to be greater. However, due to the lower pressure encountered with the refrigerant with a high boiling temperature, the load on the motor will be less.

Insulation used in the past by manufacturers of ice cream cabinets has been mostly cork. However, since cork is now a scarce item, rock wool and glass wool are coming into quite a bit of use. Of course, there are a number of other insulation materials which can be successfully used and have been used in the past, one might say that almost any insulating material that has been used in commercial refrigeration can also be used in ice cream cabinets. The problem of sealing the insulation for moisture is increased with a lower temperature but these cabinets do not require any special insulations other than used in other classes of work. I don't think that less than four inches should ever be used in an ice cream cabinet on any low temperature work. Three inches of insulation will seldom be sufficient.

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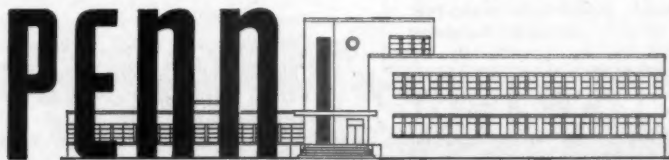


THE JOB GETS BIGGER!

Every day the load on America's refrigerating equipment gets heavier—the responsibility for service grows greater.

With canned foods under strict rationing the need for saving fresh foods is greater. To prevent spoilage of these perishable stocks and to protect the health of civilians and fighters alike, is one of the most critically important jobs in the whole war effort.

For practical help in this job look to Penn. Existing controls must be repaired locally if at all possible. Failing that, if the control is a Penn, send it to the factory—we will repair it as promptly as possible. When repair is impossible new Penn controls are available under the established priority rules. *Penn Electric Switch Co., Gosben, Ind.* In Canada, Powerlite Devices, Ltd., Toronto, Ont.



AUTOMATIC CONTROLS

FOR HEATING, REFRIGERATION, AIR CONDITIONING, ENGINES, PUMPS AND AIR COMPRESSORS

SERVICE ENGINEER

47

May, 1943

Questions and Answers at Canadian Educational Conference

ONE of the interesting features of the annual educational conference held by the Refrigeration Service Engineers Society of Canada, held at Toronto March 14 and 15 was "Information please," in which questions submitted by members of the conference were answered by a "Board of experts," consisting of government and Industrial representatives. This meeting was covered fully in the April issue of THE REFRIGERATION SERVICE ENGINEER. Among the questions and answers of general interest were the following:

Installation of Liquid Indicator

Question: I would like detailed instructions on installation for use of liquid indicator. Can indicator show clear and yet liquid line not be full of liquid? Should the liquid indicator be installed before or after the dryer?

Answer: Liquid indicators should be installed between the dryer and the expansion valves, the closer to the valve the better, so as to be certain there is a full column of liquid at the valve. Never install the indicator between the receiver and the dryer.

Repairing Domestic Controls

Question: Will you be able to continue repairing domestic controls? Is it possible to get bellows only, by sending in the old ones?

Answer: Yes, we will be able to repair domestic controls. As to the old bellows, they are of no use as they cannot be repaired and are only good for the scrap pile. Bellows have been a little hard to obtain lately because it has been practically impossible for the past sixteen months to secure the "drawings" from our suppliers and we have been using up our old stock. Bellows will, however soon become available as the "drawings are again being manufactured for us. ("Drawing" is the process of forming a cup shape from a flat disc of metal.)

Radio Interference

Question: Are there any other causes besides over-loaded lines that give radio interference?

Answer:* There are several causes (1) dirty short circuiting necklace (2) partial ground of stator caused by dirt (3) rough commutator on brush riding motor. A .005 size condenser will take out interference. When you put a condenser on you change the frequency of the noise but you do not eliminate the noise or the cause.

Hand Valves

Question: Hand valves seem to be very scarce. Will they be any more plentiful soon, or not? Would you not consider them necessary on multiple hook-ups where unit will not hold the refrigerant when it is necessary to pump out the system?

Answer: Yes. They are necessary in a system where the holding capacity of the receiver is less than the capacity of several evaporators. You have to have some means of handling this. You should not skimp on the material such as hand valves to the point where you put in an installation that cannot be serviced properly. The shortage of valves is probably localized. There is no let down in the making of these valves. It takes about 120 days from the time the order is received in the plant, entered, etc., and finally delivered, that is in the normal course of events. You can safely figure three to four months before you will get them in these days, however.

Expansion Valves

Question: On a recent installation of a peerless blower coil in a butcher box I had to use a freon thermostatic expansion valve which we thought was a little larger than necessary for the job. When the job started there was a five pound surge and a check-back showed still a five pound surge. Could valve be adjusted to the proper point to stop surging?

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TWO-TEMPERATURE VALVES**



Helping to win at sea and at home . . .



WHETHER it is in one of our submarines hunting for enemy ships or in one of our plants making fighting equipment, Temprite Constant Pressure Two-Temperature Valves are "on the job" maintaining constant temperatures and improving performance of refrigeration systems.

Today, trouble-free refrigeration systems are more important than ever before, and that is why so many Temprite Valves are today on submarine installations—their rugged construction and dependable performance make them ideal for this tough and exacting work.

★ Features ★

Easy to Adjust • Close Temperature Control • Easy to Install • Extreme Sensitivity • Wide Range of Adjustment • Rugged and Dependable

The Temprite Two-Temperature Valve is an essential part of any multiple type refrigeration system and is also recommended for use on single applications where closer and more constant regulation is required than can be furnished by the condensing unit control switch.

Available in 4 sizes to permit exact selection for your particular application.

Dealers

The Temprite Constant Pressure Two-Temperature Valves are available for dealers and distributors on authorized orders and orders direct from our armed forces.

Write our sales department for complete details.

TEMPRITE PRODUCTS CORP.

Originators of Instantaneous



Liquid Cooling Devices

45 PIQUETTE AVENUE

DETROIT, MICHIGAN

ANSWER: We have to take the presumption that the valve was over-sized because we do not have the size of the orifice. The valve called for more refrigerant, the needle was lifted from the seat enough to allow a slug of liquid to pass through and that gave the five pound surge.

Expansion Valves

Question: In water bath coolers is there much preference between the use of automatic or thermostatic expansion valves when temperature control is used?

ANSWER: On installations of that kind we should use the thermostatic valve. You want to keep the coil refrigerated at all times. The valve should feed the refrigerant into the coil completely and not by steps.

Non-Adjustable Valve

Question: What is the purpose of the non-adjustable thermostatic expansion valve?

ANSWER: To keep the service man from changing the adjustment and then if it was wrong, having the butcher changing it again of his own accord, and probably breaking it so that the repair man will have to put in a new valve. Non-adjustable valves are suitable for packaged commercial equipment where all conditions are known beforehand.

Efficiency from Condensing Unit

Question: On heat exchangers is there any quick way of determining that you are getting an increased efficiency from the condensing unit?

ANSWER: I cannot positively say, but increased efficiency will definitely cut down running time.

Deposit in Expansion Valves

Question: Why will Silica Gel break down and deposit in expansion valves, moisture normal, using methyl or freon?

ANSWER: Silica Gel is processed sand. It will not break down; at least the refrigerant will not break it down; about the only way I know of is with a hammer. Particles may rub off, but it will not completely break down. The chances are it is not Silica Gel that you find in your screen. You may have the dryer installed upside down and this will take the stuff off Silica Gel. Filters should be used. The dryer is not properly fortified on the outlet end if you find Silica Gel in

your screen. Sometimes dryers blow apart. We know that it is impossible if normal pressure were exerted for a driver to blow apart. The reasons for dryers blowing apart we suspect is caused by a hydrostatic pressure being built up in the liquid line due to the valves being closed at each end of the liquid column allowing this pressure to develop due to heat absorbed by liquid in column. One open outlet for gas should be allowed on liquid lines at all times when servicing equipment to prevent cool liquid absorbing heat and expanding.

§ § §

TOOL PROTECTION PLAN

(Continued from page 34)

a specially trained man who can weld broken stress parts, rethread stripped shanks and add new parts or cut down old ones to fix any damage. Scores of broken wrenches, pliers, drills and other tools have been thus reconditioned with a substantial saving in time and money when replacement tools are difficult to obtain.

9. No substitutions. An ironclad rule with this St. Louis firm is that no tool is substituted to do the work of another, even if the mechanic must come all the way back to the shop for the original tool. Breakage incurred in this way formerly was heavy; now amounts to nothing.

10. Proper training of new men to use their tools properly. City, like many other service firms, is making use of young, inexperienced boys as well as older men to fill in where service has called other men. Each must demonstrate a certain amount of skill with every tool he may be called upon to use before he is allowed to use it, something which Mr. Daniels urges upon all other firms with the same problem.

§ § §

Russel A. Palmer,
Spokane, Wash.

Have been helped a lot by your Question Box Dept. I think it is the best thing that ever came out for the service man. More power to you. I have several friends that wait for each copy like a child waits for Santa Claus, and the one that gets his copy first is the most popular man in town.

WANTED

YOUR POST-WAR PROBLEMS

Here is an opportunity to work direct with a leading refrigeration manufacturer and their staff of engineers in designing your post war refrigeration units. The possibilities are limitless in developing greatly improved products, particularly along the lines of domestic refrigeration, frozen food handling and sub-zero industrial applications. A great variety of new materials, processes, advanced technical and engineering skills, born of the war, are at our command to aid you in your post war thinking.

We solicit inquiries on your post war problems as well as your present essential requirements and offer our engineering facilities in working them out.

Address all inquiries to

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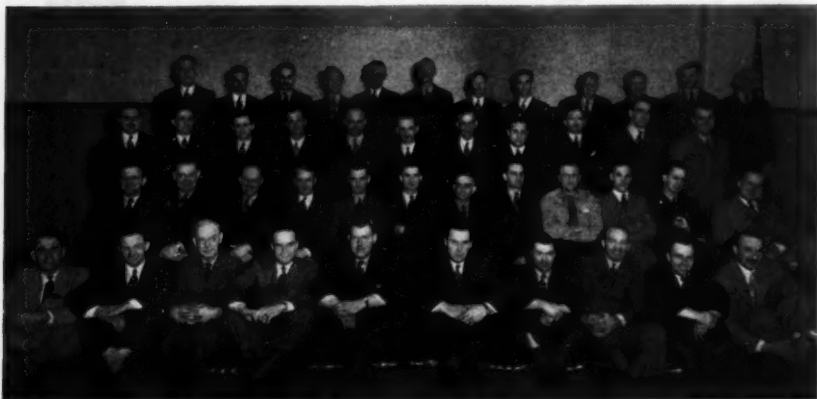
R.S.E.S. Chapter Notes

COLUMBUS CHAPTER

April. The Columbus Chapter enjoyed an evening of social entertainment the night of April 14 at the Southern Hotel, in lieu of its usual monthly business meeting. The evening's program, consisting of card games,

LOS ANGELES CHAPTER

April 16—This meeting was preceded by a chicken dinner held at the Royal Palms Hotel. W. C. Irving presided. At the opening of the meeting, Harold McQuay was appointed as ticket seller with defense stamps as his stock in trade. A total of \$12.50 was sold which, together with the \$2.50 balance from the previous meeting, made a total of \$15.00. This was divided into three books



Members of Columbus Chapter enjoy an evening of fun.

a floor show, the taking of a group picture of the members of the Chapter, and last but not least, a midnight lunch, provided fun for all who attended and attendance was close to 100 per cent.

of \$5.00 each to be drawn for at the close of the meeting.

During the course of the business session, Mr. Irving announced that C. O. McClelland, first vice-president of the Chapter had been



Los Angeles Chapter members have chicken dinner before meeting.

Functioning

FOR THE "LONG HAUL"



● Mueller Brass Co. valves, fittings and accessories are sturdily and dependably built. They have a well earned reputation for quality and are doubly desirable under present day conditions. Since refrigeration products are becoming more difficult to procure with each passing day, it is most essential that those which are installed be efficient and provided with endurance for the "long haul."

All Mueller Brass Co. refrigeration products are designed and manufactured specifically for mechanical refrigeration work. Tees, nuts and elbows, for instance, are made of forged brass—and many other fittings, bodies, etc. from specially processed brass rod.

If you have a problem, write us and we will do our utmost to help you.

MUELLER BRASS CO.
PORT HURON, MICHIGAN

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CHICAGO, ILLINOIS

called into the armed forces the previous week. At the same time, it was announced that Jimmy Rodgers had returned from the army.

Toward the close of the meeting, the defense stamp drawing was held and Jack Boxert, Al Wills and Mickey Rohan were winners of \$5.00 each in stamps. The fact that one of the names drawn at this drawing proved to be a man now in service brought about the motion that in the future where such names were drawn, the amount should be sent to the member's family to be forwarded to him.

A motion picture was presented following the meeting which dealt with army maneuvers and shorts on training views.

ONTARIO MAPLE LEAF CHAPTER

March 26—The meeting was called to order by President Marshall, and since this was the annual meeting at which time the election of officers would take place, the greater part of the business session was devoted to cleaning up old business and reports from the retiring officers. An auditors report was read to the meeting, cover-

ing both the current and convention accounts. The Secretary read his report which was duly adopted by the members.

The annual election of officers resulted in the following being elected: *President*, J. Spence; *First Vice-President*, W. Smallwood; *Second Vice-President*, W. Sneath; *Secretary*, R. G. Henderson; *Assistant Secretary*, J. W. McKee; *Treasurer*, G. Tindall; *Sergeant-at-Arms*, B. O'Connell; *Educational Chairman*, Wm. Marshall; *Entertainment*, H. F. Nye; *Membership*, D. B. Frayne; *Attendance*, Ted Smith; *Board of Directors*, G. Burns, C. Moore, A. E. Doan, G. Condie, W. Madill, J. B. Graydon, F. C. Strong.

On a motion by Mr. Ken Wood and carried by the members, refreshments were served following the meeting, the expense being handled by the entertainment committee.

April 16—The meeting was called to order by retiring President, Wm. Marshall, and within a short time after the meeting got under way, the newly elected president, James Spence, was introduced by Mr. Marshall. The entire evening was devoted

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Service Parts Company

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If deliveries are delayed owing to the material situation, you know the responsible villain. Feel sure we are doing our best.

PARTS and MATERIALS for SERVICING DOMESTIC REFRIGERATORS AVAILABLE *Without Priorities*

We ALWAYS have on hand, a complete stock of repair and replacement parts to assist you in keeping present equipment in good working order.

Our South Side Branch, 809 W. 74th St., Chicago, has a complete stock for your convenience.



Send for our 1943 catalog to Dept. RS-3.

to a discussion of gasoline and tire rationing, and to the business matters of the Chapter. A good deal of attention was paid to the problem of delinquent members and to the members who apparently have paid their annual dues, but have not as yet received credit for the payment.

MILE HIGH CHAPTER

April 19—After the customary reading of minutes, treasurer's report, and correspondence, the meeting was turned over to Mr. McCombs who discussed the newly amended Order L-88 and told how it affected the servicemen. Several questions were asked and answered, and a general discussion took place regarding this order.

Mr. McCombs, who had just returned from a trip to Chicago, also expressed his ideas on the material situation, and although the picture was black on some items, on the whole, he believed the situation was better now than at any time since the outbreak of the war, due to the fact that the Government has recognized refrigeration as an essential industry, and has written several orders accordingly.

Ernie Martin then took the floor for a discussion on household refrigerators, and their repair. His talk and the discussion that followed took up the rest of the meeting time, and the meeting was adjourned, after which refreshments were served by Mr. McCombs.

LOUISIANA CHAPTER

April 28—E. A. Summer, Baton Rouge, La., was elected president of the Louisiana Chapter for the third consecutive term at a well attended meeting held in Baton Rouge. Olen J. Crow, Scotlandville, La., was named vice-president and O. J. Goldsmith, 2207 Huron St., Baton Rouge, secretary. H. Russel Styer, Baton Rouge, was elected treasurer. The Louisiana Chapter has launched a membership drive, and is making excellent progress.

ST. LOUIS CHAPTER

January 21—This was intended to be the annual meeting and the election of officers. However, the meeting was poorly attended and the election was postponed. Discussions arose on the parts shortage situation,

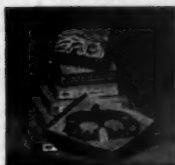
OWING to the fact that we are swamped with work we are sorry we are unable to accept any more orders until further notice. We thank you for your cooperation.

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Write for complete catalog.

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Unsurpassed Sensitivity & Dependability



FEATURES

- Readily removed orifice cartridges eliminates necessity for stocking several sizes for low tonnage installations.
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- Thoroughly field tested.
- Handles freon, methyl chloride, sulphur dioxide.

Described in New Catalog No. 52. Write today.

GENERAL



CONTROLS

267 Fifth Avenue
New York City

450 East Ohio St.
Chicago, Ill.

after which movies on the "Western Front," "Civillian Fire Fighters" and the "United States Review Number One" were shown.

February 26—The annual election of officers took place at this meeting with the following results: *President*, E. C. Fix; *Vice-President*, C. H. Tieman; *Secretary-Treasurer*, L. L. Vollman; *Sergeant-at-Arms*, J. O. Spitznagel; *Educational Chairman*, S. N. Mohler; *Board of Directors*, Messrs. A. Braun, T. Rumpf and J. Pedrotti. The newly elected officers were immediately installed and the regular business of the Chapter continued. Entertainment for the evening was provided by the showing of a movie on the making of catsup by the Heinz Company, followed by refreshments.

KANSAS CITY CHAPTER

March 9—This was the closing period of the membership drive started by the Chapter some time ago. In summing up the results, the records show that Captain DeWilde had turned in 18 applications and Captain Tramposh turned in 11. By previous arrangement, the losing team must furnish the winning team with the dinner. A final report on the eighth annual dinner-dance held March 6 was given, and it was the consensus of opinion that the affair was highly successful with everyone enjoying a pleasant evening. During a discussion of service problems of the day, Mr. Rostock suggested that as many refrigerators as possible be brought into the shop for repairs where one shop man could accomplish more with less lost time.

April 8—The annual election of officers of the Kansas City Chapter resulted in the following: *President*, R. E. Meeker; *First Vice-President*, R. F. Cox; *Second Vice-President*, C. R. Visger; *Secretary*, J. P. DeWilde; *Treasurer*, C. L. Wells; *Sergeant-at-Arms*, F. A. Thompson; *Board Members*, E. L. Tramposh, M. L. Ferguson, F. C. Smith.

DAYTON CHAPTER

March 11—The meeting was held at the Engineers Club and it was decided at this time to hold future meetings at the various supply houses. The educational program consisted of a series of questions prepared by Mr. Brock and discussed from the floor.

April 8—The meeting was held at Allied Parts Co. where meetings of the immediate future will be continued. The educational program again consisted of questions prepared by Mr. Brock.

TWIN CITIES CHAPTER

March 2—The meeting was called to order by President Ost and after the usual routine of business, George Klahn provided a discussion on government regulation P-126. Considerable discussion took place from the floor during which time many questions were answered by Mr. Klahn. A collection was taken up at the meeting for a donation to be presented to the Hennepin County Red Cross.

April 6—A treasurer's report provided at this meeting showed a very healthy balance in the treasury. The rest of the evening was devoted to business matters, and as usual at the end of the meeting, a collection was taken up for the benefit of the Ramsey County Red Cross. The amount collected was \$8.00.

MOUNT ROYAL CHAPTER

March 4—The question of a schedule for future meetings was one of the first items of business, and following this, Mr. Tremblay was called upon to read the financial report of the Chapter. The report showed a very healthy condition within the treasury and was accepted by the members. On the educational program, John Mahais presented a talk on "Fountain Hook Ups and Soldering." He also gave a description of the "Life-time Syrup Rail and Simplex Fountain." His talk proved very interesting and the members enjoyed it immensely. He talked at some length on service problems in general and had a ready answer for all questions put to him.

MONUMENTAL CHAPTER

April 9—The annual election of officers took place at this time with the following being elected: *President*, Mr. Ottenhiemer; *Secretary*, Mr. Frame; *Board of Directors*, George Roche and Charles Prescott. Other officers serving during the past year were re-elected.

MISSOURI VALLEY CHAPTER

March 4—The entire meeting was devoted to business of the Chapter and to the reading of a bulletin received from the national office relating to the management of local Chapters. On a vote by the Chapter, it was decided to adopt many of the suggestions outlined and to purchase the book-keeping system provided by the national office. A new entertainment committee was appointed in the persons of Messrs. Mahan, Delts and Weibush.

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Either an exact-duplicate or a universal type replacement for every standard refrigerator motor. With Aerovox listings you can readily pick the right capacitor for any job.

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● Idle and surplus inventories of refrigeration parts can now be put to essential use in helping to maintain the nation's huge investment in refrigeration.

We buy outright for cash, usable parts for distribution to over 20,000 refrigeration service-men customers. Let us put your idle inventories to good use—you will then be helping conserve scarce and precious materials.

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AND OODLESS

JARROW
REPLACEMENT
DOOR GASKETS

● Long life, resilient
and conform to original specifications.

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Ladies Auxiliary

KANSAS CITY AUXILIARY

March 9—The meeting was called to order by Mrs. C. R. Visger at the offices of Temperature Engineering Co. After a financial report of the Chapter was read, the ladies decided to donate \$4.00 to the American Red Cross. Mrs. Meeker was instructed to send a plant at the Chapter's expense to Mrs. H. L. Green now in the hospital. Members were urged to contribute to the blood bank as soon as the date could be arranged. As a suggested help to members of the Chapter, menus and new ideas helpful to the new rationing program were solicited for future meetings.

TWIN CITIES AUXILIARY

April—The meeting was called to order by Mrs. L. A. Ost in the absence of the President. Mrs. Lars Berheim tendered her resignation from presidency of the Chapter, ill health being given as the reason. Mrs. Otto Chermak, vice-president, was then moved up to the office of president for the remainder of the term. Mrs. Klahn was elected to the office of vice-president. After the meeting had adjourned the members went to the Hamline Hotel where they joined the men in a "Truth and Consequences" program, and where refreshments were served.

MISSOURI VALLEY CHAPTER

March 4—The meeting was held in the home of President, Mrs. Buckman, where the major part of the evening was devoted to business matters of the Chapter. Social activities occupied approximately an hour after the business meeting.

April 1—The pattern of this meeting was very similar to that of the March meeting where business occupied the first part of the evening with social activities following. Refreshments were served at the close of the meeting.

ROCKFORD AUXILIARY

March—Instead of having one of our regular meetings, a benefit bridge party was held at the home of Mrs. Dorothy Shipman. Each member was responsible for a table. The proceeds were used to purchase additional war stamps for the auxiliary.

April 5—The meeting was held at the Hotel Nelson and was presided over by the President, Mrs. Dorothy Overman. The min-

utes for the previous meeting were read and the treasurer's report for the year was read and approved. The next order of business was election of officers for the coming year, with the following results: *President*, Mrs. Dorothy Shipman; *Vice-President*, Mrs. Josephine Kruse; *Secretary*, Mrs. Everetta McCarthy; *Treasurer*, Mrs. Ida Larson; *Sgt. at Arms*, Mrs. Freda Sturch. A gift was presented to the retiring president. British Rummy was played and prizes distributed to the winners.

NEW BRUNSWICK CHAPTER

THE progress of RSES in Canada has been marked, during the past month, by the application for a charter from a group of service men in St. John, New Brunswick. Eleven signed the petition.

The new unit will be known as the New Brunswick Chapter. The following list of temporary officers has been elected: Albert J. Pike, President; George Larlee, First Vice-President; Charles Higgins, Second Vice-President; Alfred Laflamme, Secretary-Treasurer; Norman Tait, Sgt.-at-Arms.

With the addition of the New Brunswick Chapter, RSES will be represented in the Maritime Provinces by two chapters, since a charter was only recently granted to a group of service men in Halifax, Nova Scotia. The latter has adopted the name Nova Scotia Chapter.

EVENING SCHOOL OFFERS COURSE IN REFRIGERATION

IN AN effort to solve the shortage of refrigerator servicemen, the Bakersfield Evening School, Bakersfield, Calif., is offering a course in refrigerator maintenance and repair. J. U. Berry, Fresno staff member of the Pacific Gas and Electric Company, fathered the course; and offered his assistance in getting the class started. Refrigerator servicemen are being urged to attend to supplement their own knowledge, as actual work on a variety of refrigerating and cooling equipment will be part of the course.

Before the war, most local stores offered refrigerator service for a nominal sum to their customers; but as the shortage of trained men grew more acute, this was discontinued. Expert care for refrigerators during the summer heat waves here is a necessity, and this is the biggest step in the right direction yet taken.



GOOD REPORTS

on



THE REPLACEMENT GAS for METER-MISERS

THE TIRED overworked service man at the top of this ad has been hearing so many good reports on HERVEEN that he is about to call his jobber to order this modern replacement gas.

With HERVEEN in his truck to service Frigidaire Meter-Misers his recharging problem will be solved.

For more than four years jobbers have supplied HERVEEN to service men all over the country. Profitable and practical, safe and satisfactory, HERVEEN fights for freedom by saving gasoline and rubber, and above all, time.

Most jobbers stock HERVEEN —if yours doesn't write direct to

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Is Our Long
Experience
and Careful
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SUPPLIES AND EQUIPMENT**

Write for our big catalog,
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Electrimatic
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Type SL for Freon, Methyl, Sulphur
Oil, Air and Water
Ask your jobber for details

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*Automatic Control Valves
and Regulators*

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BOOKLET ON MANPOWER

TO HELP refrigeration dealers cope with the complex manpower situation involved in wartime refrigeration service the Kelvinator Division of Nash-Kelvinator Corporation has published a new booklet on the ways and means set up by the government to handle the various problems arising out of the current manpower shortage.

Called "Refrigeration Service Manpower Problems and Suggested Procedure for Meeting Them," the booklet is designed to help give appliance dealers a clear understanding of government regulations covering wages, selling price ceilings for labor charges, mechanic manpower, selective service and other phases of manpower. It is being mailed free to refrigerator retailers throughout the industry.

\$\$\$

KEELY APPOINTED MANAGER OF AIRO

AIRO SUPPLY COMPANY, 2732 North Ashland Avenue, Chicago, is now under the management of L. C. Keely, according to information received from E. P. Sorensen, president of the firm. The appointment of



L. C. Keely, Chicago, Ill.

Mr. Keely at this time is particularly fortunate, for his long experience in the refrigeration field will be helpful to Airo customers in handling problems of priority and substitute selection.

For twelve years preceding his recent affiliation with Airo, he was in charge of the Chicago sales branch of Seeger Refrigerator Company, St. Paul, and was well known to distributors and servicemen in the middle west. Mr. Keely's first connection in the refrigeration field was that of vice-president in charge of sales and advertising with the Zerozone Corporation with which he was associated for a number of years.

His successful career in our industry follows an equally successful performance in the automotive field where he served as general sales manager for one of Chicago's largest automotive dealers.

WEATHERHEAD HOST TO A.S.R.E.

THE Cleveland Chapter of the American Society of Refrigerating Engineers held its regular meeting in the Cafeteria of the Weatherhead Company, Cleveland, April 20. H. D. Andress, chairman of the Cleveland section, conducted the meeting. R. P. Gibson, industrial sales manager, James Strachan, refrigeration sales manager, and A. L. Lennox, sales engineer of Weatherhead were hosts for the company.

Following cocktails and dinner, Charles Segal of the Kramer-Trenton Company, Trenton, N. J., described the Kramer balanced loader system featured by his firm. A model refrigeration machine was shown in operation first without, then with this system.

The group, numbering over 50, were conducted on a tour of the Weatherhead plant, and shown how Weatherhead packless valves and refrigeration dryers and strainers are manufactured. Each guest was presented with a copy of the Weatherhead Pictorial Review of 1942.

LEONARD W. HERR, DECEASED

LEONARD W. HERR, sales engineer for Acme Industries for the past two years, died suddenly April 24. He was 53 years old. Active in the refrigerating industry for the past 25 years, he was a speaker at the recent Refrigeration Industry Wartime Conference held in Chicago, April 18 and 14. Previous to his connection with Acme, he had been with the Henry Vogt Machine Co. for 15 years, and later was with Carrier Corp., Binks Manufacturing Co., and Savage Arms Corp. He was a member of the American Society of Refrigerating Engineers.

SERVICE ENGINEER

An Announcement

Airo Supply Co.

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CHICAGO

WHOLESALE DISTRIBUTORS
of Refrigeration and Air Conditioning

Parts Announce the
Appointment of

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as Manager

It is the aim of Mr. Keely to maintain and, if possible, even surpass the fine record of service that has characterized the AIRO organization.

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VISOLEAK

Ally yourself with the Industry
program of CONSERVATION.

SAVE refrigerant and time.

SIMPLIFY leak detection problems.

VISOLEAK shows you those "hard-to-find" leaks, and is successful with all refrigerants. Use four fluid ounces plus one ounce for each 10 lbs. of refrigerant to treat a system.

4 Ounce Size.....	\$ 1.00
8 Ounce Size.....	1.75
1 Pint Size.....	3.00
1 Quart Size.....	5.00
1 Gallon Size.....	16.00

Buy it from your jobber or write direct to

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WHAT MAKES US THIS WAY?

WHY do we advertise, month after month, that you can "Depend on Blythe"? We answer: "Because it is true!" We'd be stupid if we didn't advertise it. We know how a service man prizes dependability in his jobber. We prove every day, even in these tough war times, that we are dependable. Ask any of our service men customers.

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COOLING and FREEZING UNITS

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WEST COAST CONTROL SERVICE

Cold Controls • Pressure Switches

One year guarantee
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Original Factory Specifications

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EXPANSION VALVES

Rebuilt or Exchanged

Automatic (any make).....	\$1.25
Thermostatic (any make).....	\$2.75
Water valves	\$2.25

COLD CONTROLS

Domestic	\$2.00
Commercial (low or pressure).....	\$2.25
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All work done on money back guarantee.

(All fittings must accompany order)

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SLOCUM TO NEW POST



Claude S. Slocum

CLAUDE S. SLOCUM has been appointed factory representative for General Controls Co., Glendale, Calif., manufacturers of pressure, temperature and flow controls. He will serve the Rocky Mountain territory as well as Kansas City, Mo. He will also work through the panhandle section of Texas and

northern New Mexico. His new headquarters will be located at 2135 South Adams Street, Denver, Colo. Mr. Slocum is well known throughout Colorado and adjoining states. He steps into his new job with a wide experience in both sales and service. For the past three years he has been Colorado distributor for the General Controls line. Prior to that he was service manager for Tidmore Engineering Co. of Tucson, Ariz. Later he organized the firm of Means and Slocum, specialists in warm air heating.

DAVISON CHEMICAL REPORT

THE DAVISON CHEMICAL CORPORATION, reports for the nine months ending March 31, 1943 net earnings of \$1,084,431, after all charges and reserves for taxes. The earnings for the nine months are equivalent to \$2.11 per share, and compare with \$1.35 per share or \$695,734 for the same period in 1942. No provision has been made for any effect on the earnings of the corporation which may result from Government contract renegotiations nor for any special reserves or year end adjustments at the end of June when the new fiscal year starts.

The sales volume for the nine months has shown an increase of 53 per cent. The war has caused an increase in demand for old products, but development of new products and new uses for old products accounts for a substantial part of the increase.

STEPHANIE MAVIS MARKHAM

CHARLES MARKHAM and Mrs. Markham, of Chicago, announce the arrival on May 7 of a new daughter, Stephanie Mavis Markham. The new papa is receiving congratulations from his many friends throughout the refrigeration industry.

NEW CATALOGS AND BULLETINS

A WIDE range of industrial safety equipment providing protection for the head, eyes, nose, throat, lungs and other parts of the body, is described in the 25th edition for the Chicago Eye Shield Co. catalog.



Illustrations and descriptions include various types of protective lenses, goggles, welders, helmets and shields, respirators, masks, grinder guards and toe guards. Copies available if requested on business letterhead by writing direct to Chicago Eye Shield Co., 2800-C Warren Blvd., Chicago, Ill.

THE KRAMER TRENTON COMPANY, Trenton, N. J., has issued a new four-page folder on Kramer Coolant coolers. These coolers are of the shell and fin tube type, consisting of a special fin cooling coil inserted into a steel shell. They are designed for use with water, brine or direct expansion refrigerant. Another two-page bulletin covers the Victory Coolmaster, a new line of unit coolers. Either or both of these Bulletins will be mailed free upon request to the company.

Classified Ads

Rate: Two Dollars for fifty words or less.
30 cents for each additional ten words or less.

CARBON TETRACHLORIDE, \$1.40 per gallon in 5 gallon lots; limited quantity, \$1 deposit for container, $\frac{1}{2}$ to $\frac{3}{4}$ h.p. air cooled condenser, \$6.00. $\frac{3}{4}$ to $\frac{1}{2}$ h.p. 2 cylinder Frigidaire compressor, \$7.00. All used, in good condition. F.O.B. Edison Cooling Corp., 310 E. 149th St., New York City.

FOR SALE

Used High Side Floats

for all makes of household refrigerators, any gas.

Ball type, $\frac{3}{4}$ in. diameter, $\frac{1}{2}$ in. high, purge screw on top, $\frac{1}{4}$ in. liquid line, $\frac{1}{4}$ in. discharge line, 4 screw holes 1 in. from bottom. Perfect condition.

\$3.25 each

Westinghouse Unloader Valves, also in perfect condition @ \$4.75 each.

Assorted Used Porcelain Evaporators

in good condition, flooded type.

U Shape—Sizes

$8\frac{1}{2}$ in. wide, $9\frac{1}{2}$ in. high, $11\frac{1}{2}$ in. deep

@ \$6.75.

$8\frac{1}{2}$ in. wide, $7\frac{1}{2}$ in. high, $11\frac{1}{2}$ in. deep

@ \$6.75 each.

$9\frac{1}{2}$ in. wide, 10 in. high, 12 in. deep @

\$6.75 each.

Prices F.O.B. Chicago—Subject to Prior Sale

ACME REFRIGERATION PARTS CO.

5217 W. MADISON ST., CHICAGO, ILL.

Telephone Columbus 4141

DEHYDRATORS

ALL TYPES

REBUILT LIKE NEW

New Felts and New Strainers installed. Refilled with New Davison Sillica Gel.

Price: \$1.00 for up to 1 Ton Dehydrator — F.O.B. New York. All fittings must accompany order.

$\frac{1}{2}$ H. P. Air Cooled
Condenser 26" long
13" high—26 Tubes

Double row—

Double throw \$6.00

$\frac{1}{3}$ - $\frac{1}{2}$ H. P. Frigidaire
Compressor

Bodles \$7.00



NEW YORK CONTROL CO.
534 Courtlandt Ave., New York City

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Important

Don't let idle cylinders hold up supplies now available. Look through your stocks and warehouses for any empty cylinders, or cylinders which can be emptied . . . and return them promptly.



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YOU CAN LOOK FROM NOW
 UNTIL NEXT WEEK...THERE'S NO
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Four reasons why Davison's gives outstanding results,
 saves you time and money, assures satisfied customers:

GREATER CAPACITY—1½ to 2 times as much
 capacity as other drying agents.

ACTS INSTANTLY—Saves time on every job.

REMOVES ACIDS—Prevents formation of corrosive sludge.

WILL NOT CAKE NOR POWDER—Refrigerant always
 flows freely.

Successful service engineers agree—"It's Master over Moisture."

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ALWAYS ASK YOUR JOBBER FOR

Davco Accelerated

SILICA GEL



More valuable *Today* than precious jewels

BECAUSE ratchets, sockets, wrenches and other hand tools are needed in such huge quantities by our Armed Forces, the tools you now have in your tool kit are more valuable than the most precious jewels.

You can walk into any jewelry store and buy the most expensive jewelry without trouble—but if you've tried to buy hand tools lately you know how difficult they are to get—if you can get them at all.

Because of this condition, it's just good, plain common-sense to take the best possible care of the tools you now have.

The ratchet in your tool kit is a valuable tool—hard to replace today—take good care of it. The handle has been made long enough to give maximum leverage. *Don't* put a pipe over the handle to get extra leverage to loosen a stubborn nut. If you do you're putting an undue strain on the lug, the extension, the socket, the whole ratchet—liable to make those tools unfit for future use.

Never under any circumstances grease your BONNEY Ratchet. Give it a gasoline or kerosene bath once a week to clean out accumulated grease and dirt. Then lubricate it with a good grade of light oil.

With proper care your BONNEY Ratchet—all your BONNEY TOOLS—will last indefinitely. Take good care of them—they are more valuable today than precious jewels.



BONNEY FORGE & TOOL WORKS, ALLENTOWN, PA.

